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THE PHILIPPINE
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NEW PLANTS FROM SORSOGON PROVINCE, LUZON

By E. D. MERRILL *

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

This pap is based almost wholly on material recently collected in So.ogon Province, Luzon, a region in which very little field work has been prosecuted in botany since the exploration of that prov.ice by Haenke, one of the botanists of the Malaspina Expedition, in about the year 1792. The field work was done by Maximo Ramos, who spent from July 22, 1915, to September 14, 1915, in Sorsogon, working on Bulusan Volcano, Mount Kililibong, Mount Pocdal, Mount Bogacaua, Mount Lalao, and at Lake Polog. In this time he collected about four hundred numbers of flowering plants and ferns, of which a number, on examination, prove to be undescribed species. In addition to the forty previously undescribed forms considered in this paper, Mr. Elmer has indicated nineteen additional sheets of this collection as representing new species, presumably in those cases where material collected by Ramos matches material collected by himself in his exploration of Sorsogon subsequent to Ramos's trip. Some material, on account of inadequate specimens, immature flowers, or lack of flowers or fruits, still remains to be considered at a later date when the species shall have been collected again. The novelties in the collection as a whole approximate 15 per cent, which must be considered rather a high one, in view of the fact that field work has been actively prosecuted in the Philippines for about thirteen years, and that the collector, on whose material this paper is based, has no botanical training

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and no technical knowledge of the subject. It affords a good illustration of the fact that in spite of what has been done in the past thirteen years, we have really but made a beginning on the botanical exploration of the Philippines.

In the present paper one genus and forty species are described as new, while the genus *Schuurmansia* is new to the Archipelago. This latest addition to the list of Philippine *Ochnaceae* is of considerable phytogeographical interest, as it adds another genus to the already long list that indicates the close geographical relationships of the Philippine flora to that of the islands to the south and southeast. Hallier [1] who has recently considered the genus, has removed the Bornean *Schuurmansia angustifolia* Hook. f. as the type of a new genus, *Schuurmansiella*, leaving *Schuurmansia* with seven species, confined to Amboina, New Guinea, Ternate, Halmaheira, and New Mecklenburg. To these may now be added two additional species in Luzon; one described as new in the present paper, and the other transferred to *Schuurmansia* from *Calophyllum*, where it was originally described by Fernandez-Villar.

GRAMINEAE

RAMOSIA genus novum

(*Festucae, Eufestucae*)

Spiculae oblongo-ovatae, leviter compressae, 1- ad 3-florae, laxe paniculatae, rhachilla inter flores elongata, vix articulata, glabra, ultra flores fertiles producta gluma vacua valde reducta instructa; floribus hermaphroditis. Glumae 2 inferiores vacuae, acutae vel acuminatae, 5- vel 7-nerves, obscure carinatae, inaequales; florentes acutae, membranaceae, quam vacuis paullo longioribus, 7- vel 9-nerves, basi leviter inflatae, inter nervis obscure sulcatae. Palea 2-carinata. Stamina 2. Styli distincti, tenui, stigmatibus plumosis. Caryopsis glabra, nitida, nigra, anguste oblonga, teres, libera. Gramen humile simplex, foliis planis. Panicula laxa, spiculis breviter pedicellatis, glumis ♀ distantibus.

RAMOSIA PHILIPPINENSIS sp. nov.

Glabra, e basi prostrata usque ad 20 ad 30 cm alta; foliis lanceolatis, acuminatis, membranaceis, usque ad 6 cm longis et 5 mm latis, vaginis quam internodiis brevioribus, margine ciliatis; paniculis exsertis, simplex, 5 ad 9 cm longis, ramis paucis, 2 ad 4 cm longis; spiculis purpureis, oblongis, breviter pedicel-

[1] Hallier f. Ueber die Luxemburghieen-gattungen Schuurmansia, Schuurmansiella und Blastemanthus. Recueil Trav. Bot. Néerl. 10 (1913) 340–355.

latis, racemose dispositis, 4 ad 5 mm longis; glumis exterioribus inaequalibus, acutis vel acuminatis, 5- vel 7-nerviis, fertilibus 1 ad 3, 7- vel 9-nerviis, circiter 3 mm longis.

A glabrous slender, simple or but slightly branched, apparently annual grass, the lower parts of the stems prostrate, rooting, the leafy parts erect or ascending, 20 to 30 cm high, the culms smooth, glabrous, striate, about 1 mm in diameter. Leaves membranaceous, glabrous, narrowly lanceolate, 4 to 6 cm long, 3 to 5 mm wide, acuminate; ligule membranaceous, hyaline, about 1.5 mm long; sheaths close, shorter than the internodes, their margins prominently ciliate with short hairs. Panicles simple, exserted, oblong-pyramidal, 5 to 9 cm long, the branches 5 to 11, spreading or ascending, distant, solitary, 2 to 4 cm long, the spikelets racemosely arranged on the simple branches, 5 to 12 on each branch. Spikelets oblong to oblong-lanceolate, somewhat compressed, purplish, 4 to 5 mm long, their pedicels minutely scabrid, about 1 mm long, apparently continuous. Empty glumes 2, the first oblong-lanceolate, acuminate or slightly apiculate, obscurely keeled, 5-nerved, about 2.7 mm long, the second similar to the first but about 3.2 mm long. Flowering glumes 1 to 3 in each spikelet, the rachilla produced above the empty glumes and between each flowering glume, the lower rachilla joints nearly 1 mm long, the upper ones 1.2 to 1.5 mm long, glabrous, extending beyond the upper flowering glume and ending in a greatly reduced empty glume which often appears as a mere rudiment or slight enlargment of the end of the rachilla, the glumes 7- or 9-nerved, about 3.8 mm long, oblong-lanceolate, slightly apiculate, usually acute, the basal part slightly rounded-inflated and obscurely sulcate between the nerves, the fourth and fifth glumes, when present, similar to the third one but slightly shorter. Caryopsis black, smooth, shining, narrowly oblong, cylindric, about 1 mm long.

LUZON, Province of Sorsogon, Lake Polog, *Bur. Sci. 23607 Ramos*, August 27, 1915, growing along the border of the lake either in wet swampy places or in shallow water.

The genus is rather anomalous in several respects, the plant in habit strongly resembling some forms of *Panicum nodosum* Kunth, except in its shorter culms, and some forms of *Ichnanthus pallens* Munro, but its floral structure removes it at once from the *Paniceae*. Often but a single flowering glume is present in each spikelet, but frequently two are present, and less frequently three. The rachilla is elongated between all the glumes, and extends above the last flowering glume, bearing at its apex a very greatly reduced empty glume, so reduced at times as to appear merely as the slightly enlarged tip of the rachilla. The rachilla does not appear to be jointed, but the pedicels appear to be jointed at the base, for at least they separate from the rachis very easily.

After considerable study of this plant I am inclined to place it in the general alliance with *Glyceria* R. Brown, but am not entirely satisfied that this is its proper disposition. In its facies and in details it is quite different from *Glyceria*. Its striking distinguishing characters are its 1- to 3-flowered spikelets, its distant glumes, its flowering glumes slightly inflated and longitudinally sulcate at the base, and its produced rachilla that is tipped with a very greatly reduced sterile glume, so reduced usually as to appear like a mere enlargement of the tip of the rachilla.

The genus is dedicated to Maximo Ramos, who for many years has been employed by the Bureau of Science as a botanical collector, and whose field work has yielded material on which the descriptions of several hundred new species have been based.

ARACEAE

POTHOS Linnaeus

POTHOS DOLICHOPHYLLUS sp. nov. § *Allopothos, Longevaginati.*

Alte scandens, glabra; foliis coriaceis, in siccitate pallidis, anguste lanceolatis, usque ad 45 cm longis et 6 cm latis, tenuiter longissime caudato-acuminatis, basi obtusis, leviter inaequilateralibus, nervis collectivis utrinque 2 vel 3, distinctis; petiolo circiter 15 cm longo, in siccitate tubuloso, usque ad geniculis vaginato; pedunculis 2 vel 3, 4 ad 7 cm longis; spathis oblongo-ovatis, coriaceis, usque ad 15 cm longis et 5.5 cm latis, caudato-acuminatis; spadicis sessilibus, cylindraceis, 4 ad 5 cm longis, circiter 1 cm diametro.

A stout, climbing vine, rooting copiously at the nodes, the stems about 1 cm in diameter, the nodes not prominent, the internodes about 2 cm long. Leaves coriaceous, pale when dry, narrowly lanceolate, slightly inequilateral, 30 to 45 cm long, 4 to 6 cm wide, base somewhat narrowed, obtuse, apex long and slenderly caudate-acuminate, the acumen up to 3 cm in length, the midrib very prominent, the longitudinal collective nerves 2 or 3 on each side of the midrib, slender, distinct, the third one when present submarginal; petiole about 15 cm long, cylindric when dry, narrowly winged throughout its length, at most 8 mm in diameter. Peduncles 2 or 3, each subtended by a narrowly lanceolate, long-acuminate, somewhat sheathing bract up to 11 cm in length, the peduncles 4 to 5 cm long. Spathes oblong-ovate, coriaceous, up to 15 cm long and 5.5 cm wide, long and slenderly caudate-acuminate. Spadices sessile, cylindric, obtuse, 4 to 5 cm long, about 1 cm in diameter.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23708 Ramos* (type), in damp forests, August 6, 1915. SAMAR, Ambalate, *Bur. Sci. 17628 Ramos*, April 6, 1914.

A most striking species, clearly in the alliance with *Pothos rumphii* Schott, but with entirely different leaves, much broader spathes, and shorter, sessile spadices.

URTICACEAE

ELATOSTEMA Forster

ELATOSTEMA HOLOPHYLLUM sp. nov.

Repens, simplex, partibus junioribus parce hirsutus; receptacula staminiferis distincte pedunculatis, paucifloris, bracteis exterioribus 4 ad 5 mm longis, corniculatis; foliis inaequilateraliter oblongis, integris, usque ad 2.5 cm longis, obtusis; stipulis magnis, membranaceis, in paribus valde inaqualibus, usque ad 8 mm longis.

A prostrate slender plant, unbranched, rooting at the nodes, the stems up to 20 cm in length, sparingly hirsute. Leaves inaequilateral, entire, oblong, 1.5 to 2.5 cm long, 0.5 to 1 cm wide, obtuse, the midrib on the lower surface sparingly hirsute, cystoliths scattered, prominent; lateral nerves 2 or 3 on each side of the midrib, distant, obscure, reticulations obsolete; petioles 2 mm long or less; stipules thin, brownish, in unequal pairs, the larger of each pair inequilateral, oblong to ovate-oblong, up to 8 mm long, at least twice as large as the smaller one. Male receptacles solitary, their peduncles up to 1 cm in length, the bracts broadly ovate, corniculate, up to 6 mm long. Male flowers few in each receptacle, the outer two bracteoles oblanceolate, somewhat navicular, 4 to 5 mm long, with a slender 1.5 to 2 mm long spur, the inner two much smaller. Sepals 4, broadly ovate to oblong-ovate, about 3 mm long, somewhat apiculate and obscurely bearded or hirsute at the apex.

LUZON, Province of Sorsogon, Mount Bagacaua, *Bur. Sci. 23329 Ramos*, August 20, 1915, growing on trees in the mossy forest. A smaller form of what is apparently the same species, but with shorter leaves and short-peduncled receptacles is represented by *Bur. Sci. 23546 Ramos*, from Mount Lalao, Sorsogon.

The species is well characterized by its simple, prostrate stems, and especially by its entire, oblong, obtuse leaves. It does not appear to be closely allied to any previously described species of the genus.

PROCRIS Commerson

PROCRIS BRUNNEA sp. nov.

Frutex monoicus, epiphyticus, ut videtur scandens, glaber, *P. pseudostrigosae* affinis, differt foliis minoribus, in siccitate subtus uniformiter brunneis, nervis paucioribus, 5 vel 6 utrinque.

An epiphytic, monoecious, apparently scandent, glabrous shrub, the branches brownish and wrinkled when dry, 3 to 4 mm in diameter. Leaves coriaceous, stiff, brittle, when dry the

upper surface dark brownish-olivaceous, the lower uniformly brown in color, the cystoliths small, very numerous, slightly inequilateral, oblong, straight or slightly falcate, 5 to 9 cm long, 2 to 3.5 cm wide, entire, rather prominently acuminate, base acute; lateral nerves 5 or 6 on each side of the midrib, prominent, curved, the reticulations obsolete or nearly so; petioles short, the younger ones minutely lepidote as are the very tips of the branchlets and the midrib on the lower surface of young leaves. Staminate inflorescences solitary, from the axils of fallen leaves, many flowered, long peduncled, apparently pendulous, cymose, obscurely brown-lepidote, the peduncles slender, 4 to 6 cm long, the cymes lax, 5 to 6 cm in diameter. Buds globose, about 2 mm in diameter, the sepals oblong-obovate, obtuse, about 2 mm long. Female inflorescence axillary, mostly in the upper axils, capitate, hemispheric, very dense, about 5 mm in diameter, very many flowered, the flowers crowded, minute, the achenes narrowly ellipsoid, about 1 mm long.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23705 Ramos*, August 7, 1915, on trees in the mossy forest.

A species manifestly allied to *Procris pseudostrigosa* Elm., but easily distinguished by the characters mentioned in the diagnosis above.

PROTEACEAE

HELICIA Loureiro

HELICIA OLIGOPHLEBIA sp. nov.

Arbor parva, glabra; foliis olivaceis, breviter petiolatis, nitidis, glabris, ovatis ad elliptico-ovatis, coriaceis, utrinque subaequaliter angustatis, usque ad 10 cm longis, acuminatis, basi acutis ad obtusis, margine irregulariter distanter serratis, dentibus obtusis, nervis utrinque circiter 6, distinctis; inflorescentiis usque ad 18 cm longis, multifloris, floribus circiter 14 mm longis, pedicellis basi breviter connatis.

A small glabrous tree, the branches terete, brownish or grayish. Leaves numerous, ovate to ellptic-ovate, coriaceous, 6 to 10 cm long, 3 to 6 cm wide, olivaceous, shining, subequally narrowed to the shortly and obtusely acuminate apex and to the acute to obtuse base, rather coarsely and irregularly toothed, the teeth obtuse; lateral nerves about 6 on each side of the midrib, prominent on the lower surface, the primary reticulations lax, distinct; petioles very short, scarcely exceeding 2 mm in length. Inflorescence up to 18 cm in length, many flowered, mostly lateral, solitary or sometimes in pairs. Flowers green and white, slender, in pairs, about 14 mm long, base and apex

of the buds slightly enlarged, the enlarged parts of the sepals. above the insertion of the stamens narrowly oblong, about 3.5 mm long. Anthers about 2.5 mm long. Ovary glabrous. Pedicels 2 to 3 mm long, in pairs, slightly united at the base.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23320* (type), *23632 Ramos*, August, 1915, on forested slopes near the summit of the mountain.

This is in the group with *Helicia philippinensis* Meissn. and *H. cumingiana* Meissn., but has rather smaller leaves with fewer lateral nerves than either of the above species. It is, however, manifestly very closely allied to both.

RANUNCULACEAE

NARAVELIA DeCandolle

NARAVELIA PHILIPPINENSIS sp. nov.

Scendens, inflorescentiis sepalisque prominente ferrugineo-pubescentibus exceptis glabra; ramulis brunneis vel pallidis, cylindraceis, longitudinaliter striatis; foliis 3-foliolatis, foliolis integris, ovatis ad oblongo-ovatis, usque ad 9 cm longis, chartaceis, glabris, nitidis, apice obtusis vel obscure apiculatis, basi rotundatis ad acutis, 5-pli- vel obscure 7-plinerviis, nervis exterioribus rectis, adscendentibus, reticulis laxis; inflorescentiis axillaribus, usque ad 20 cm longis, paucifloris; floribus 4-meris, sepalis oblongis, acutis, recurvatis, circiter 9 mm longis, utrinque ferrugineo-pubescentibus.

A scandent plant, the branches terete, up to 4 mm in diameter, pale or brown when dry, longitudinally striate, the internodes up to 20 cm in length. Leaves 3-foliolate, glabrous, their petioles about 10 cm long, often twining about branches and other objects to support the plant; leaflets glabrous, shining, olivaceous, chartaceous, oblong to ovate-oblong, 6 to 9 cm long, 3.5 to 5 cm wide, entire, base rounded to somewhat acute, distinctly 5-plinerved or indistinctly 7-plinerved, apex obtuse or obscurely apiculate; nerves leaving the midrib within the lower 1 cm, the outer, basal ones straight, prominent, ascending, the reticulations lax; petiolules 3 to 4 cm long, like the petioles sometimes twining. Panicles axillary, up to 20 cm long, rather narrow, few flowered, the lower primary branches scarcely exceeding 3 cm in length, the upper shorter, all parts rather prominently ferruginous-pubescent with short hairs. Flowers yellowish, 4-merous, their pedicels 1 to 1.5 cm long. Sepals oblong, acute, recurved, ferruginous-pubescent or both surfaces, about 9 mm long and 4 mm wide. Petals none. Stamens indefinite, slender, slightly cinerous-puberulent, 6 to 7 mm long.

LUZON, Province of Sorsogon, Mount Bagacaua, *Bur. Sci. 23459 Ramos*, August 21, 1915, on slopes in thickets or forests.

This species is well characterized by its 5-plinerved, entire, shining leaves and its ferruginous inflorescence. It seems to be very closely allied to *Naravelia antonii* Elm., but my specimen of that species is entirely glabrous.

ANONACEAE

PHAEANTHUS Hooker f. & Thomson

PHAEANTHUS NITIDUS sp. nov.

Arbor, partibus junioribus inflorescentiis foliisque plus minusve pubescentibus; foliis oblongis, chartaceis, usque ad 16 cm longis, tenuiter acute acuminatis, basi acutis, nervis utrinque 11 ad 13, prominentibus, in siccitate uniformiter castaneis, nitidis; floribus longe pedicellatis, petalis interioribus oblongis, obtuse acuminatis, circiter 2.5 cm longis; ovulis solitariis.

A tree, the branchlets and inflorescence distinctly ferruginous-pubescent, the branches and branchlets slender, terete. Leaves castaneous when dry, shining, oblong, chartaceous, 12 to 16 cm long, 4.5 to 6 cm wide, the upper surface with scattered ferruginous hairs, ultimately glabrous or nearly so, the lower surface of about the same color, ferruginous-pubescent on the midrib and lateral nerves; lateral nerves 11 to 13 on each side of the midrib, prominent, gradually curved; petioles pubescent 3 to 5 mm long. Inflorescence extra-axillary, each with but one or two yellowish flowers at a time, peduncled, more or less corymbose, ferruginous-pubescent. Pedicels slightly pubescent, about 3 cm long. Sepals very minute, less than 0.5 mm long. Outer three petals triangular-ovate, acute, somewhat pubescent, less than 1 mm long. Inner three petals oblong, coriaceous, about 2.5 cm long and 1 cm wide at maturity, outside sparingly pubescent, especially at the base, inside glabrous, nearly black when dry, somewhat excavated at the base inside. Stamens very numerous, about 2 mm long, the connectives obliquely truncate. Carpels numerous, pubescent, gibbous, with the styles 3.5 to 4 mm long; ovules solitary.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23477 Ramos*, July 29, 1915, in forests on the lower slopes.

This species is manifestly allied *Phaeanthus ebracteolatus* (Presl) Merr. (*P. cumingii* Miq.), from which it is readily distinguished by its leaves being uniformly castaneous when dry, its ferruginous indumentum, and its more numerously nerved, long, and sharply acuminate leaves. Apparently referable here is *Bur. Sci. 20922 Ramos*, from Mount Isarog, Province of Camarines, Luzon, distributed as *Phaeanthus ebracteolatus* Merr.

GONIOTHALAMUS Blume

GONIOTHALAMUS BRUNNEUS sp. nov.

Frutex vel arbor, glabra, ramis ramulisque teretibus; foliis oblongis, coriaceis, in siccitate brunneis, nitidis, usque ad 22 cm longis, apice brevissime abrupte acuminatis, basi acutis, nervis utrinque circiter 10, tenuibus, distinctis; floribus rubris, solitariis, e axilis defoliatis, circiter 5.5 cm longis, petalis exterioribus circiter 2 cm latis; stylis tenuibus, elongatis; ovulis 1.

A shrub or small tree, entirely glabrous except the slightly pubescent parts of the flower. Branches and branchlets terete, pale-brownish. Leaves oblong, coriaceous, brown and shining when dry, 15 to 22 cm long, 5 to 8 cm wide, the apex very shortly and abruptly blunt-acuminate, base acute, the lower surface paler than the upper, smooth; lateral nerves slender, distinct, brown, about 10 on each side of the midrib, anastomosing, the primary reticulations slender, lax; petioles stout, 5 to 8 mm long. Flowers red, in the axils of fallen leaves, solitary, their pedicels stout, 1.5 to 2 cm long. Sepals broadly ovate, coriaceous, rounded, glabrous, about 8 mm long. Outer three petals coriaceous, oblong, at maturity about 5.5 cm long and 2 cm wide, acute, glabrous or with few, minute, scattered, shining, brownish hairs; inner three petals thickly coriaceous, oblong-ovate, 1.5 cm long, 8 mm wide, somewhat pubescent. Stamens indefinite, 3 to 3.5 mm long, linear, flat. Carpels indefinite, narrowly oblong, appressed-hirsute, 2 mm long; ovules solitary; style slender, glabrous, about 3 mm long; stigma slightly enlarged, obscurely and minutely 2-toothed.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci. 23680 Ramos*, September 6, 1915, on damp forested slopes.

In many respects this species resembles *Goniothalamus mindanaensis* Merr. (*G. philippinensis* Elm.), especially in its leaf characters. It is readily distinguished, however, by its oblong inner petals which are 5.5 cm long and 2 cm wide, those of the species mentioned above being very broadly ovate, 3.5 to 4 cm in width.

LAURACEAE

CRYPTOCARYA R. Brown

CRYPTOCARYA AFFINIS sp. nov.

Species *C. ilocanae* Vid. similis et affinis, differt foliis in siccitate brunneis, nitidis, glabris, nervis utrinque 2 vel 3, ramis ramulisque brunneis, laevis, glabris.

A tree, quite glabrous except the inflorescence which is sparingly appressed pubescent. Branches and branchlets slender,

smooth, shining, glabrous, brown, terete. Leaves coriaceous, oblong-ovate, uniformly brown, shining, and of about the same color on both surfaces when dry, 5 to 8 cm long, 2.5 to 3.5 cm wide, base acute, prominently triplinerved, apex subcaudate-acuminate, acumen up to 1.5 cm long, blunt; basal nerves reaching to the upper three-fourths of the leaf, the lateral nerves leaving the midrib at from 3 to 7 mm above the base, at most two on each side of the midrib, distant, prominent, coarsely anastomosing, the ultimate reticulations close, both surfaces under a lens shallowly and densely subfoveolate; petioles glabrous, brown, 1 cm long or less. Panicles 5 to 7 cm long, obscurely pubescent. Fruits glabrous, globose or broadly ovoid, dark-brown when dry, smooth, not at all ribbed, about 8 mm in diameter.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23338 Ramos*, September 10, 1915, in damp forests.

Manifestly very closely allied to *Cryptocarya ilocana* Vid., from which it is distinguished by its brown, shining, glabrous, fewer nerved, more prominently acuminate leaves and its entirely glabrous, smooth and shining, brown branches and branchlets. Otherwise it is very similar to Vidal's species, and presents in common with it prominently triplinerved leaves.

LITSEA Lamarck

LITSEA CONFERTA sp. nov.

Arbor, subtus foliis petiolis ramulisque dense ferrugineo-pubescentibus; foliis subverticillatis, elliptico-ovatis, coriaceis, usque ad 14 cm longis, prominente acuminatis, basi acutis, nervis utrinque circiter 7, valde prominentibus, adscendentibus; fructibus e ramis infra foliis, dense confertis, numerosis, ovoideis, glabris, in siccitate verruculosis, nigris, 8 ad 10 mm diametro, calycibus leviter accrescentibus, 4–5-dentatis, persistentibus, extus plus minusve ferrugineo-pubescentibus.

A tree, the branchlets, lower surface of the leaves, and the petioles densely ferruginous-pubescent with short hairs, the older branches quite glabrous. Leaves subverticillate, somewhat crowded at the tips of the branchlets, elliptic-ovate, coriaceous, 8 to 14 cm long, 4 to 6.5 cm wide, the apex prominently and rather sharply acuminate, the base acute, the upper surface smooth, shining, under a lens densely subfoveolate-raticulate, the midrib and nerves more or less pubescent; lateral nerves about 7 on each side of the midrib, very prominent, ascending, curved-anastomosing, the primary reticulations subparallel, distinct; petioles 1.5 to 2 cm long. Fruits crowded on the branches below the leaves in sessile, subcapitate, rather dense

infructescences, about 3 cm in diameter, usually 10 to 12 fruits in each head, the pedicels stout, 2 to 3 mm long, and with the persistent, somewhat accrescent calyx more or less ferruginous pubescent, the calyx distinctly 4- or 5-toothed, about 7 mm in diameter, the fruits ovoid to subglobose, apparently fleshy, when dry black, wrinkled, glabrous, 8 to 10 mm in diameter.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23348 Ramos*, August 29, 1915, in damp forests.

A species manifestly closely allied to *Litsea tayabensis* Elm., but with entirely differently shaped, shorter, fewer nerved leaves.

LITSEA SORSOGONENSIS sp. nov.

Arbor circiter 12 m alta, ramulis junioribus inflorescentiisque ferrugineo-puberulis, foliis junioribus subtus minute obscure puberulis, vetustioribus glabris; foliis alternis, oblongis ad anguste oblongis, coriaceis, usque ad 17 cm longis, utrinque subaequaliter angustatis, basi acutis, apice obtusis ad breviter obtuse acuminatis, nervis utrinque circiter 8, prominentibus, adscendentibus; umbellulis axillaribus et e axillis defoliatis, breviter pedunculatis, bracteatis, 5-floris; staminibus fertilibus 9, antheris omnibus 4-locellatis, introrsis.

A tree about 12 m high, the young branchlets and the inflorescence ferruginous-puberulent. Branches terete, brown. Leaves alternate, oblong to narrowly oblong, coriaceous, 10 to 17 cm long, 3 to 5.5 cm wide, rather pale-olivaceous when dry, paler beneath, subequally narrowed to the acute base and to the somewhat obtuse to obscurely obtuse-acuminate apex, the upper surface glabrous, the lower surface at first minutely puberulent, ultimately glabrous, both surfaces under a lens minutely and shallowly subfoveolate-reticulate; lateral nerves about 8 on each side of the midrib, very prominent, ascending, somewhat curved, anastomosing, the primary reticulations slender, not prominent; petioles 1 to 1.5 cm long, ultimately glabrous. Umbellules fascicled, numerous, in the axils of the leaves and in the axils of fallen leaves, the peduncles ferruginous-puberulent, up to 5 mm in length, somewhat thickened upward. Bracts obovate to suborbicular, concave, rounded, ferruginous-puberulent, about 5 mm in diameter. Flowers yellowish-white, 5 in each umbellule, pedicelled, the tube pubescent. Perianth lobes 6, oblong-ovate to oblong, obtuse, about 3 mm long, spreading in anthesis, pubescent outside. Fertile stamens 9, in three series, all anthers 4-celled, introrse.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci. 23678 Ramos*, September 6, 1915, in damp forests on the lower slopes. Apparently

referable here is *Bur. Sci. 23332 Ramos*, from Mount Bagacaua, Sorsogon, but the leaves are smaller, and the flowers are immature.

The species in facies resembles *Litsea euphlebia* Merr., but is distinguished at once by its inflorescence. In the present species the umbellules are fascicled, while in *L. euphlebia* they are arranged in racemes. It is very close to *Litsea oblongifolia* Merr., from which it differs in its fewer nerved, smaller leaves, nine stamens, and in other minor characters.

LITSEA ANOMALA sp. nov.

Arbor alta, inflorescentiis floribusque exceptis glabra; foliis alternis, penninervis, oblongo-ovatis, coriaceis, usque ad 13 cm longis, prominente acuminatis, utrinque subaequaliter angustatis, basi acutis, nervis utrinque 8 ad 10, prominentibus; inflorescentiis e axillis defoliatis, solitariis vel fasciculatis, 2 ad 3 cm longis, umbellulis 5-floris, racemose dispositis, bracteis glabris; floribus 6-meris, adpresse ferrugineo-pubescentibus, staminibus 6, antheris 4-locellatis, omnibus introrsis.

A tall nearly glabrous tree, the branches terete, brownish when dry, the younger ones irregularly angular. Leaves numerous, alternate, oblong-ovate, coriaceous, 7 to 13 cm long, 3 to 5.5 cm wide, brownish-olivaceous when dry, or the lower surface uniformly brown, slightly shining, subequally narrowed to the acute base and to the prominently acuminate apex; lateral nerves 8 to 10 on each side of the midrib, prominent on both surfaces, rather straight and somewhat ascending, brown on the lower surface, obscurely anastomosing, reticulations nearly obsolete; petioles 2 to 3 cm long. Inflorescences of simple, racemosely arranged umbellules, solitary or sometimes fascicled, mostly from the axils of fallen leaves, 2 to 3 cm in length, the rachis and peduncles sparingly cinereous-puberulent, the peduncles 6 to 10 mm long. Umbellules globose in bud, the bracts four, glabrous or nearly so, obovoid, rounded, concave, rather prominently nerved, about 4 mm long. Flowers 5 in each umbellule, 4 to 5 mm in length, the perianth-tube appressed ferruginous-pubescent, somewhat enlarged upward, about 2 mm long. Lobes 6, oblong, obtuse, about 2 mm long, obscurely ciliate at the apex. Fertile stamens 6, their filaments somewhat pilose; anthers all 4-celled, introrse; filaments of the outer row eglandular, of the inner row 2-glandular at the base.

LUZON, Province of Sorsogon, Lake Polog, *Bur. Sci. 23652 Ramos*, August 26, 1915, in forests.

This species does not appear to be closely allied to any previously described Philippine representative of the genus, and has been placed in *Litsea* tentatively. It is somewhat anomalous in the genus in that its

flowers present but six stamens, the normal number being usually nine or twelve. However, in all other characters it appears to be a true *Litsea*.

SAXIFRAGACEAE

DICHROA Loureiro

DICHROA PLATYPHYLLA sp. nov.

Frutex erectus partibus junioribus inflorescentiisque exceptis glaber; ramulis incrassatis, usque ad 1 cm diametro; foliis ellipticis vel oblongo-ellipticis, membranaceis, usque ad 25 cm longis et 12 cm latis, acuminatis, irregulariter dentatis, nervis utrinque 7 vel 8, valde prominentibus; floribus numerosis, 4-meris, petalis leviter puberulis, staminibus 4, stigmate leviter incrassato.

An erect shrub at least 1 m high, the ultimate branchlets much thickened, up to 1 cm in diameter, when dry pale brownish, the older parts glabrous, the tips somewhat puberulent. Leaves, membranaceous, slightly shining, olivaceous when dry, elliptic to oblong-elliptic, up to 25 cm long and 12 cm wide, the apex slenderly and sharply acuminate, the base somewhat decurrent-acuminate, the upper surface ultimately quite glabrous, the lower surface paler and somewhat puberulent on the midrib and lateral nerves, the teeth irregular, rather prominent, somewhat triangular, acuminate up to 2.5 mm long, sinuses rounded; lateral nerves 7 or 8 on each side of the midrib, prominent, curved-ascending, the reticulations prominent, lax; petioles 2 to 3 cm long. Panicles in the uppermost axils, forming a terminal inflorescence with a few reduced leaves, puberulent, the individual panicles subcorymbose, peduncled, up to 10 cm in length. Flowers rather numerous, blue, 7 to 8 mm in diameter, 4-merous, rather laxly arranged, their pedicels up to 5 mm long. Calyx slightly puberulent, 3 to 4 mm long, the teeth triangular, about 1 mm long. Petals oblong, obtuse, spreading, slightly puberulent, 4 mm long, 1.8 mm wide. Stamens 4. Styles 4, spreading, about 3 mm long, the stigmas somewhat thickened.

LUZON, Province of Sorsogon, Mount Lalao, *Bur. Sci. 23416 Ramos*, August 11, 1915, in damp forests.

This species is well characterized by its broad leaves and its 4-merous flowers. In fact it is anomalous in *Dichroa* in that it presents but four stamens instead of from 10 to 12 as in the other described species of the genus. In all other characters it is distinctly a *Dichroa*, and is accordingly placed in this genus. Except in its very much larger leaves the present species has much the facies of *Dichroa philippinensis* Schltr., but the latter has flowers with ten stamens.

MELIACEAE

AGLAIA Loureiro

AGLAIA BREVIPETIOLATA sp. nov.

Species *A. luzoniensis* Merr. & Rolfe (*A. monophyllae* Park.) affinis, differt foliis multo minoribus, usque ad 7 cm longis et 2.5 cm latis, nervis utrinque 5 vel 6, petiolis brevioribus, 5 ad 7 mm longis.

A small tree, the branches terete, glabrous, the younger branchlets rather densely cupreous-lepidote. Leaves simple, oblong-lanceolate, coriaceous, pale-brownish and rather dull when dry, 5 to 7 cm long, 1.5 to 2.5 cm wide, the upper surface glabrous, the lower with few scattered cupreous scales on the midrib and lateral nerves; nerves 5 or 6 on each side of the midrib, slender, anastomosing, the reticulations obsolete or nearly so; petioles cupreous-lepidote, 5 to 7 mm long. Fruit obovoid, brown when dry, about 1.5 cm long, densely and minutely cupreous-lepidote, in short, axillary, solitary racemes, the rachis scarcely exceeding 1 cm in length.

LUZON, Province of Sorsogon, Mount Bagacaua, in damp forests, *Bur. Sci. 23522 Ramos*, August 19, 1915.

This species manifestly belongs in the same group with *Aglaia luzoniensis* Merr. & Rolfe (*A. monophylla* Perk.), from which it is readily distinguished by its much smaller, very much narrower, differently shaped, fewer nerved, coriaceous leaves, and its short petioles. It is one of the few known representatives of this large genus having simple leaves.

APHANAMYXIS Blume

APHANAMYXIS CORIACEA sp. nov.

Arbor alta, ramulis junioribus parce ferrugineo-puberulis; foliis usque ad 45 cm longis, foliolis inaequilateralibus, coriaceis, oblongo-ellipticis ad oblongo-obovatis, usque ad 14 cm longis rotundatis ad breviter obtuse acuminatis, basi acutis, nervis utrinque 8 ad 10, distinctis, reticulis subobsoletis; spicis axillaribus, solitariis, usque ad 35 cm longis, multifloris, circiter 1.5 cm diametro; sepalis 5, pubescentibus, liberis vel subliberis; petalis 3, glabris; antheris 6; ovario obscure hirsuto, 3-loculare.

A tall tree, the ultimate branches stout, pale, about 1 cm in diameter, the younger parts ferruginous-puberulent. Leaves up to 45 cm long, the petiole and rachis obscurely puberulent, rather stout; leaflets usually about 13, coriaceous, pale-olivaceous, inequilateral, oblong-elliptic to oblong-obovate, stiff when dry, slightly shining, base inequilateral, acute, apex rounded to broadly and shortly acuminate, the upper surface entirely glabrous, the lower very sparingly pubescent on the midrib and

lateral nerves, becoming glabrous or nearly so; lateral nerves 8 to 10 on each side of the midrib, prominent, obscurely anastomosing close to the margin, the reticulations subobsolete. Spikes rather stout, up to 35 cm long, the rachis about 3 mm in diameter, cinereous-puberulent, the upper part including the rather densely arranged, sessile, yellowish-white flowers, about 1.5 cm in diameter. Sepals reniform-ovate, rounded, free or nearly so, coriaceous, about 3 mm long and 4 mm wide, pubescent. Petals 3, free, concave, coriaceous, rounded, about 8 mm long, elliptic to elliptic-obovate. Staminal tube obovoid, about 6 mm long, contracted at the truncate mouth, glabrous, free. Anthers 6, included, 3.4 mm long. Ovary very obscurely hirsute, 3-celled; stigma narrowly pyramidal, furrowed, acute, about 2.5 mm long, glabrous.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23576 Ramos*, September 10, 1915, in damp forests.

The alliance of this species is manifestly with **APHANAMYXIS ELMERI** (Merr.) (*Amora elmeri* Merr.), from which it differs in many characters, including its larger flowers, prominently pubescent sepals, and puberulent inflorescences and younger parts of the plant. From *Aphanamyxis perrottetiana* (C. DC.) Harms it differs notably in its smaller, much fewer nerved leaflets, which are never rounded at the base.

SABIACEAE

MELIOSMA Blume

MELIOSMA VULCANICA sp. nov.

Arbor circiter 10 m alta, inflorescentiis parcissime pubescentibus exceptis glabra; foliis 1-foliolatis, subcoriaceis, oblongis ad oblongo-ellipticis, longe petiolatis, usque ad 13 cm longis, breviter acuminatis, basi acutis, margine integris, nervis utrinque circiter 6, subtus valde prominentibus; paniculis terminalibus et e axillis superioribus, erectis, pedunculatis, circiter 10 cm longis; floribus 5-meris, petalis glabris, exterioribus late ovatis ad suborbicularis, 2.3 ad 3 mm latis, interioribus oblanceolatis, acutis.

A tree about 10 m high, quite glabrous except the sparingly pubescent inflorescence, the branches and branchlets terete. Leaves simple, subcoriaceous, oblong to oblong-elliptic or sometimes narrowly oblong-obovate, 7 to 13 cm long, 3 to 5.5 cm wide, brown and slightly shining when dry, entire, apex slightly acuminate, base acute, the lower surface a little paler than the upper; lateral nerves about 6 on each side of the midrib, prominent on the lower surface, dark-brown, anastomosing, the primary reticulations lax, distinct; petioles 2.5 to 3.5 cm long.

Panicles erect, terminal and in the upper axils, peduncled, comparatively few-flowered, slightly pubescent. Flowers white, fragrant, the bracteoles ovate, acute, about 1 mm long, slightly pubescent, equalling or shorter than the pedicels. Sepals broadly ovate, 1 to 1.3 mm long, obtuse, margins slightly ciliate-pubescent, the inner three slightly larger than the outer two. Outer three petals glabrous, rather thick, broadly ovate to subreniform, about 2.5 mm long, 2.3 to 3 mm wide, rounded. Inner petals oblong-oblanceolate, acute, about 1.6 mm long and less than 0.5 mm wide. Ovary glabrous.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci., 23657 Ramos,* September 4, 1915, on forested slopes.

A species well characterized by its simple, glabrous, entire, rather long-petioled leaves, quite different from all other known Philippine and Malayan forms.

MELIOSMA MEGALOBOTRYS sp. nov.

Arbor alta, partibus junioribus inflorescentiisque ferrugineo-pubescentibus; foliis pinnatis, circiter 25 cm longis, foliolis circiter 13, oblongis, integris, acuminatis, usque ad 9 cm longis, nervis utrinque circiter 7; paniculis terminalibus, circiter 50 cm longis, breviter pedunculatis, ramis inferioribus usque ad 20 cm longis; floribus sessilibus, petalis exterioribus circiter 2 mm diametro, interioribus valde reductis, bifidis.

A tall tree, the younger parts and the inflorescence rather prominently brown- or ferruginous-pubescent with short hairs. Ultimate branches rather stout, about 1 cm in diameter. Leaves pinnate, about 25 cm long, the rachis sparingly pubescent; leaflets about 13, oblong, entire, acuminate, base rounded to acute, 7 to 9 cm long, 2 to 3 cm wide, subcoriaceous, the upper surface pale and somewhat shining when dry, the lower surface pale-brownish, sparingly pubescent on the midrib and lateral nerves; lateral nerves about 6 on each side of the midrib, prominent on the lower surface. Panicles terminal, pyramidal, up to 50 cm long, the lower branches up to 20 cm in length, apparently spreading, all parts more or less brown-pubescent. Flowers numerous, sessile, mostly in groups of threes along the ultimate branchlets, white, the bracteoles ovate, acute, somewhat pubescent, about 1 mm long. Sepals similar to the bracteoles. Outer three petals suborbicular, rounded, about 2 mm in diameter, the inner two reduced to a cleft scale less than 1 mm long adnate to the basal part of the fertile filaments. Ovary ovoid, glabrous, about 1 mm long.

LUZON, Province of Sorsogon, Mount Lalao, *Bur. Sci. 23516 Ramos,* August 14, 1915, on forested slopes.

Among the Philippine species with pinnate leaves this one is well characterized by its rather small, entire leaflets, its very large, brown-pubescent panicles, and sessile flowers.

TILIACEAE

TRICHOSPERMUM Blume

TRICHOSPERMUM ERIOPODUM (Turcz.) comb. nov.

Grewia eriopoda Turcz. in Bull. Soc. Nat. Mosc. 31[1] (1858) 231; Vid. Phan. Cuming. Philip. (1885) 99, Rev. Pl. Vasc. Filip. (1886) 70; F.-Vill. Novis. App. (1880) 30.

SAMAR, *Cuming 1680* (type number). LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci. 23658 Ramos*, September 6, 1915.

This species was described from flowering specimens collected in about the year 1838, and has not appeared in our recent collections until the year 1915, when Ramos discovered it in Sorsogon Province. The recently collected material is in fruit, which enables me definitely to remove the species from *Grewia* and transfer it to *Trichospermum*. The capsules are 2-valved, somewhat compressed, about 2 cm wide and 1 cm long, very broadly ovoid or somewhat reniform, slightly apiculate, clothed with long, brownish, shining, soft hairs. The species is very closely allied to *Trichospermum leytense* Merr., the latter being distinguished especially by its somewhat pubescent leaves.

DILLENIACEAE

SAURAUIA Willdenow

SAURAUIA SORSOGONENSIS sp. nov.

Frutex, ramulis subtus foliis ad costa nervisque petiolis inflorescentiis prominente adpresse setosis, sepalis exterioribus valde patule setosis; foliis oblongis, in siccitate brunneis, usque ad 12 cm longis, acute acuminatis, basi obtusis, nervis utrinque 6 ad 8; floribus axillaribus, solitariis et longe pedicellatis vel in cymis paucifloris, sepalis exterioribus prominente setosis, circiter 9 mm longis, interioribus angustioribus, glabris vel parce setosis; stylis 3 vel 4, liberis, 4 ad 5 mm longis.

A shrub, rather prominently appressed-setose, the sepals with numerous, spreading, setose hairs. Branches terete, pale-brownish, the older ones glabrous, the younger ones rather densely covered with pale or brownish, stout, appressed setae. Leaves firmly chartaceous, brown when dry, oblong, 7 to 12 cm long, 2 to 4 cm wide, sharply acuminate, base obtuse, the margins setose-toothed, the upper surface nearly glabrous, or with few, scattered, very short, appressed scales, the lower surface much paler than the upper, with more or less scattered, appressed, rather slender setae on the midrib, nerves, and prominent reticulations; lateral nerves 6 to 8 on each side of the midrib, prominent; petioles densely appressed-setose, about 1 cm long.

Flowers white, axillary and in the axils of fallen leaves, solitary or in reduced, few-flowered cymes, their pedicels slender, appressed-setose, 1 to 1.8 cm long, when cymose not more than three flowers in a cyme, the peduncles about as long as the pedicels, the bracts lanceolate, acuminate, about 7 mm long. Outer three sepals ovate, about 9 mm long, 6 mm wide, uniformly densely setose with spreading, rather slender, brown setae, the inner two sepals narrowly oblong, 9 mm long, 4 mm wide, thinner than the outer, glabrous except for the exposed median part near the base which is sparingly setose. Ovary glabrous; styles 3 or 4, free to the base, 4 to 5 mm long.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci., 23681 Ramos*, September 5, 1915, in the mossy forest.

This species is allied to *Saurauia gracilipes* Merr. and to *S. elmeri* Merr., the group having the two inner sepals much narrower than the outer three and nearly glabrous, the flowers mostly solitary, and long pedicelled. It differs from both in its much stouter, very much more prominent setae.

SAURAUIA OLIGANTHA sp. nov.

Frutex, partibus junioribus parcissime breviter adpresse furfuraceo-setosis; foliis oblongo-ellipticis ad oblongo-obovatis, usque ad 10 cm longis, acuminatis, nervis utrinque circiter 5; floribus axillaribus, pedicellatis, vel in cymis bifloris, sepalis circiter 4 mm longis, parcissime adpresse setosis; stylis 3, liberis, circiter 3 mm longis.

A shrub, the young branchlets densely covered with short, closely appressed, scalelike setae, otherwise nearly glabrous. Branches terete, brownish. Leaves subcoriaceous, oblong-elliptic to oblong-obovate, 6 to 10 cm long, 2.5 to 4 cm wide, obscurely acuminate or merely acute, base obtuse to rounded, the margins distantly and shortly setose-toothed, the upper surface brownish-olivaceous when dry, with very few, widely scattered, small scales, the lower surface much paler, with few scattered scales on the midrib and nerves; lateral nerves about 5 on each side of the midrib, prominent, curved, anastamosing. Flowers white, axillary, solitary or in 2-flowered cymes, the pedicels 1 cm long or less, the peduncles, when present, as long as the pedicels, both sparingly brown furfuraceous-setose. Outer three sepals broadly ovate to suborbicular, rounded, about 4 mm long, with few short, appressed scales, the inner two similar but thinner. Petals 5, oblong-obovate, retuse, about 6 mm long. Ovary glabrous; styles 3, free to the base, about 3 mm long.

LUZON, Province of Sorsogon, Mount Bagacaua, *Bur. Sci. 23426 Ramos*, August 20, 1915, in the mossy forest.

Apparently as closely allied to *Saurauia sparsiflora* Elm. as to any other species, but with much smaller, fewer nerved leaves, which are not prominently toothed.

OCHNACEAE

SCHUURMANSIA Blume

SCHUURMANSIA PARVIFOLIA sp. nov.

Arbor glabra, foliis confertis, oblanceolatis vel oblongo-oblanceolatis, in siccitate brunneis, nitidis, usque ad 7 cm longis, apice obscure acuminatis, leviter crasse apiculatis, basi attenuatis, nervis utrinque densissime confertis; paniculis terminalibus, multifloris, usque ad 12 cm longis, floribus circiter 6 mm diametro.

A glabrous tree, the leaves crowded near the ends of the branchlets, the branchlets terete, brownish, with numerous, rather crowded petiolar scars. Leaves oblong-oblanceolate to oblanceolate, coriaceous, uniformly brown and shining on both surfaces when dry, entire, the apex shortly acuminate and with an obscure, stout apiculus, below gradually narrowed in the lower one-half or two-thirds, the nerves very numerous, densely arranged, slender; petioles usually about 1 cm long, the lamina more or less decurrent. Panicles terminal, very many flowered, erect, up to 12 cm long, branched from or near the base, the lower branches 5 to 6 cm long. Flowers white. Sepals elliptic, rounded, about 3 mm long. Petals ovate-elliptic to obovate, rounded, 4 mm long. Stamens 5, 3 mm long, the filiform staminodes nearly as long as the stamens. Ovary ovoid, about 0.5 mm long.

LUZON, Province of Sorsogon, Lake Polog, *Bur. Sci. 23648 Ramos*, August 25, 1915.

Except for the plant described by F.-Villar as *Calophyllum vidalii*, the above is the first representative of the genus to be found in the Philippines. With the addition of two Philippine species of *Schuurmansia*, the genus now comprises nine distinct species extending from southern Luzon to New Guinea, but not extending to the Sunda Islands.[3]

SCHUURMANSIA VIDALII (F.-Vill.) comb. nov.

Calophyllum vidalii F.-Vill. ex Ceron Cat. Pl. Herb. Manila (1902) 229, plate.

Calophyllum cuneatum Vidal l. c. in syn.

LUZON, Province of Camarines Sur, Mount Isarog, *Vidal 2134* in herb. Kew.

Opportunity is here taken to transfer to its proper family and genus the species mentioned above that was placed by F.-Villar in *Calophyllum*.

[3] Hallier, H. Ueber die Luxemburghieen-gattungen Schuurmansia, Schuurmansiella und Blastemanthus. Recueil Trav. Bot. Néerl. 10 (1913) 340–355.

The specimen on which the species was based was collected by Vidal, and although no number is cited by F.-Villar in the original description, it is *Vidal 2134*, which is represented by a duplicate in the Kew Herbarium. It is very curious that the species should have been described as a *Calophyllum*, with which genus it has little in common except that the venation of the leaves is somewhat suggestive of that genus.

This species is manifestly closely allied to the preceding, but apparently has larger leaves. Moreover, the leaves are retuse at the apex, not coarsely apiculate, and are dull and pale when dry, not uniformly brown and shining, while the nerves are distinctly more prominent. In the first supplement to Index Kewensis *Calophyllum vidalii* is listed but the authority for the species is erroneously given as Ceron, and the place of publication erroneously as Vidal's "Revision de plantas vasculares de Filipinas," a work that appeared in 1886, not in 1892. The latter is the date of publication of Ceron's "Catálogo de las plantas del herbario" in which the original description and plate appear.

GUTTIFERAE

GARCINIA Linnaeus

GARCINIA MICROPHYLLA sp. nov. § *Mangostana*.

Arbor glabra, 6 ad 8 m alta, ramis teretibus, ramulis tenuibus obscure angulatis, internodis brevibus; foliis numerosis, confertis, oblongo-ellipticis, coriaceis, usque ad 4 cm longis, utrinque subaequaliter angustatis, basi acutis, apice breviter rostrato-acuminatis, margine revolutis, nervis tenuibus, numerosis; cymis solitariis vel binis, axillaribus, 2-floris; floribus 4-meris; staminibus in phalangibus stipitatis dense confertis; fructibus globosis, 1 ad 2 cm diametro, seminibus 1 vel 2.

A small glabrous tree 6 to 8 m high, the branches slender, terete, the branchlets obscurely 4-angled, the internodes short. Leaves very numerous, crowded, oblong-elliptic, 3 to 4 cm long, 1 to 2 cm wide, coriaceous, brownish and somewhat shining when dry, subequally narrowed to the acute base and to the shortly rostrate-acuminate apex, the acumen blunt, margins recurved; lateral nerves very numerous, slender, densely arranged, not prominent; petioles 2 to 3 mm long. Flowers 4-merous, small, on the branchlets below the leaves, solitary or in short, 2-flowered cymes, the peduncles short, the whole inflorescence not exceeding 5 mm in length. Outer 2 sepals reniform-ovate, about 1 mm long, the inner two subelliptic, concave, about 4 mm long. Petals 4, as long as the inner sepals, elliptic, rounded. Stamens numerous, arranged on four phalanges, the phalanges, 3.5 mm long, the lower 1 mm without anthers, otherwise with scattered sessile anthers on all parts. Rudimentary style 2 mm long, the stigma discoid or depressed-globose, about 1.2 mm in diameter. Fruit globose, 1 to 2 cm in diameter, brown when dry, the pericarp

crustaceous, brittle, crowned with the disklike stigmatic scar. Seeds 1 or 2, hemispheric, about 1.5 cm in diameter.

LUZON, Province of Sorsogon, Lake Polog, *Bur. Sci. 23633 Ramos*, August 26, 1915, in flower (type); Mount Kililibong, *Bur. Sci. 23479 Ramos*, August 16, 1915, in fruit.

The alliance of this species is with *Garcinia eugeniaefolia* Wall. and *G. gitingensis* Elm., from which it is distinguished by its decidedly smaller leaves which have revolute margins. Perhaps it is but a reduced form of *Garnicia eugeniafolia*, due to its habitat.

RHIZOPHORACEAE

GYNOTROCHES Blume

GYNOTROCHES LANCEOLATA sp. nov.

Arbor glabra, foliis subcoriaceis, lanceolatis, usque ad 7 cm longis et 2 cm latis, tenuiter acuminatis, in siccitate nitidis, brunneis, nervis utrinque circiter 6; floribus numerosis, fasciculatis, pedicellatis, 4-meris, sepalis circiter 2 mm longis.

An entirely glabrous tree, the branches terete, the young branchlets dark-brown in color, smooth, shining. Leaves lanceolate, subcoriaceous, 4.5 to 7 cm long, 1 to 2 cm wide, when dry brown and shining, paler beneath, narrowed above to the rather slenderly acuminate apex and below to the acute base; lateral nerves about 6 on each side of the midrib, distinct on the lower surface, and like the midrib and distinct reticulations darker in color than the leaf surface; petioles 3 to 4 mm long. Flowers 4-merous, very numerous, in axillary fascicles, their pedicels 4 to 5 mm long, jointed in the middle. Sepals oblong-ovate to ovate, obtuse to acute, about 2 mm long. Petals obovate, fimbriate, nearly as long as the sepals. Style-arms 7 or 8, radiate, short. Fruit red, fleshy, about 4 mm long, much wrinkled when dry.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23407 Ramos*, August 6, 1915, in forests.

A species differing from *Gynotroches axillaris* Blume in its much smaller, quite differently shaped leaves, and from *G. parvifolia* Merr., in its entirely differently shaped, much narrower, prominently and rather slenderly acuminate leaves.

MYRTACEAE

EUGENIA Linnaeus

EUGENIA SUBCAUDATA sp. nov. § *Syzygium*.

Arbor parva, glabra, *E. paucipunctatae* affinis, differt foliis haud puncticulatis, inflorescentiis multo brevioribus pauciflori-busque, floribus majoribus, calycis tubo circiter 5 mm longo.

A small glabrous tree, the branches and branchlets terete,

brownish. Leaves numerous, coriaceous, crowded, oblong-elliptic, olivaceous when dry, the lower surface greenish, not punctate, 4 to 6 cm long, 1.5 to 2.5 cm wide, subequally narrowed to the acute base and to the slenderly subcaudate-acuminate apex, the acumen blunt, about 1 cm long; lateral nerves slender, crowded, about 30 on each side of the midrib, the primary ones scarcely distinguishable from the secondary ones, anastomosing with a distinct submarginal nerve, the margins cartilaginous and distinctly revolute; petioles 3 to 4 mm long, slender. Inflorescence terminal, 2 cm long or less, with few branches and few flowers, the flowers sessile, mostly in triads on the very short ultimate branchlets. Calyx ellipsoid, not funnel-shaped, about 5 mm long. Young fruit subglobose, about 1 cm in diameter.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23324 Ramos*, August 18, 1915, in forests near the summit of the mountain, apparently at an altitude of about 1,000 meters.

Manifestly very closely allied to *Eugenia paucipunctata* Merr., its leaves in size, shape, texture, and venation being almost identical with those of that species; they are not glandular-punctate however. The inflorescence is quite different, being shorter, with but very few, larger flowers, the calyx-tube ellipsoid, not funnel-shaped.

EUGENIA SORSOGONENSIS sp. nov. § *Jambosa.*

Arbor alta, glabra ramis ramulisque teretibus; foliis oppositis, oblongis ad oblongo-obovatis, subcoriaceis, in siccitate subolivaceis, nitidis, haud puncticulatis, usque ad 11 cm longis, apice acuminatis, basi acutis, nervis utrinque circiter 8, distinctis, laxis; inflorescentiis terminalibus, e basi ramosis, subcorymbosis, circiter 7 cm longis, floribus in triadibus dispositis, numerosis, in alasbastro circiter 1 cm longo.

A tall glabrous tree, the branches and branchlets terete, rather smooth, pale-brownish. Leaves opposite, oblong to oblong-obovate, subcoriaceous, 8 to 11 cm long, 3 to 4.5 cm wide, the apex rather prominently but shortly acuminate, base acute, the upper surface olivaceous or brownish-olivaceous, smooth and shining when dry, the lower surface much paler, not glandular-punctate; lateral nerves about 8 on each side of the midrib, slender, prominent, somewhat brownish, lax, curved, anastomosing, the reticulations lax; petioles 5 to 8 mm long. Inflorescence terminal, corymbose, branched from the base, up to 7 cm long and at least as wide, rather many flowered. Flowers white, in triads at the tips of the ultimate branchlets, shortly pedicelled, the calyx-tube narrowly funnel-shaped, about 7 mm long, the lobes 4, short, rounded. Petals 4, free. Stamens very numerous, elongated, slender.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23373 Ramos*, August 1, 1915, in forests on the lower slopes.

In leaf-form and appearance this species strongly resembles *Eugenia balerensis* C. B. Rob. (*E. brunnea* C. B. Rob.), but the latter has its flowers solitary on the ultimate branchlets, not in triads. Its true alliance seems to be with *Eugenia cinnamomea* Vid., but while it closely resembles that species its inflorescence is entirely glabrous.

EUGENIA BREVIPANICULATA sp. nov. § *Jambosa.*

Arbor alta, glabra, ramis ramulisque teretibus; foliis oppositis, ellipticis ad oblongo-ellipticis, coriaceis, in siccitate supra olivaceis, subtus pallidis, basi acutis, apice breviter obtuse acuminatis, usque ad 7 cm longis, nervis utrinque 4 vel 5, subtus distinctis, laxis; inflorescentiis terminalibus lateralibusque, brevibus, paucifloris, calycis infundibuliformis, circiter 1 cm longis.

A tall glabrous tree, the branches pale, terete, the branchlets slender, the ultimate ones 2 mm in diameter or less, terete. Leaves opposite, elliptic to oblong-elliptic, coriaceous, 4 to 7 cm long, 2 to 3.5 cm wide, subequally narrowed to the acute base and to the shortly and obtusely acuminate apex, the upper surface olivaceous when dry, the lower pale, somewhat shining; lateral nerves 4 or 5 on each side of the midrib, slender but prominent on the lower surface, anastomosing, the reticulations obsolete or nearly so; petioles 2 to 3 mm long. Inflorescence terminal, axillary, and in the axils of fallen leaves, at most 3 cm long, usually shorter, usually 3- to 5-flowered, the flowers white, often in triads, or the inflorescence often reduced to a single triad. Calyx-tube funnel-shaped, about 1 cm long, the lobes reniform, about 2 mm wide, shorter than wide. Style slender, about 1.5 cm long.

LUZON, Province of Sorsogon, Mount Bagacaua, *Bur. Sci. 23567 Ramos*, August 21, 1915, in forests along small streams.

This species belongs in the group with *Eugenia xanthophylla* C. B. Rob., and is perhaps as near *Eugenia llanosii* Merr. as any other described form. It is, however, very different from that species. Its leaves very closely resemble those of *Eugenia whitfordii* Merr., but that species has cauline inflorescences.

EUGENIA LEUCOCARPA sp. nov. § *Syzygium.*

Arbor alta, glabra, ramis ramulisque teretibus; foliis coriaceis, oblongo-obovatis ad late oblongo-oblanceolatis, usque ad 5.5 cm longis, nitidis, in siccitate supra olivaceis, subtus pallidis, apice breviter abrupte acuminatis, deorsum gradatim angustatis, basi acutis, nervis utrinque numerosis, dense dispositis, subtus prominente purpureo-puncticulatis. Inflorescentiis terminalibus, 6

ad 8 cm longis, paniculatis; fructibus globosis, albidis, edulis, in siccitate circiter 6 mm diametro.

A tall glabrous tree, the branches and branchlets slender, terete, brownish, rather smooth. Leaves coriaceous, oblong-obovate to broadly oblong-oblanceolate, 4 to 5.5 cm long, 1.5 to 2.5 cm wide, the apex abruptly and shortly acuminate, gradually narrowed in the lower two-thirds to the acute or cuneate base, the upper surface olivaceous when dry, shining, the lower paler and distinctly glandular-punticulate with numerous dark-purplish glands; lateral nerves very numerous, slender, indistinct, densely arranged; petioles about 5 mm long. Panicles terminal, 6 to 8 cm long, the branches few, the lower ones up to 5 cm long, spreading-ascending, each bearing three secondary branches above the middle. Calyx immediately following anthesis somewhat urceolate, truncate, about 3 mm long. Fruit white, fleshy, edible, when dry rather hard, pale, globose, about 6 mm in diameter.

LUZON, Province of Sorsogon, Mount Bulusan, *Bur. Sci. 23672 Ramos*, September 4, 1915, in damp forests.

A characteristic species in the group with small flowers, terminal inflorescence, and densely nerved leaves. It does not appear, however, to be especially closely allied to any of the previously described Philippine forms.

EUGENIA DURA sp. nov. § *Syzygium.*

Arbor alta glabra ramis ramulisque teretibus vel ramulis leviter compressis; foliis oppositis, coriaceis, ellipticis ad oblongo-ellipticis, usque ad 9 cm longis, utrinque subaequaliter angustatis, apice breviter subcaudato-acuminatis, basi acutis, nitidis, in siccitate olivaceo-brunneis, subtus pallidioribus, nervis primariis utrinque circiter 15, tenuibus, margine revolutis; inflorescentiis terminalibus, corymbosis, floribus ut videtur in triadibus dispositis; fructibus in siccitate valde induratis, oblongo-ellipsoideis vel junioribus cylindraceis, usque ad 2.5 cm longis, brunneo-purpureis.

A tall glabrous tree, the branches and branchlets terete, brownish, smooth, or the slender branchlets somewhat compressed. Leaves opposite, coriaceous, elliptic to oblong-elliptic, 7 to 9 cm long, 2 to 4 cm wide, subequally narrowed to the acute base and to the rather slender and short subcaudate-acuminate apex, the acumen up to 1 cm long, blunt, when dry the upper surface strongly shining, very smooth, olivaceous-brownish, the lower surface much paler, not punctate; lateral nerves indistinct, the primary ones about 15 on each side of

the midrib, slender, scarcely more evident than the secondary ones, anastomosing with a faint submarginal nerve, the leaf margin revolute; petioles about 1 cm long. Inflorescence terminal, corymbose, in fruit about 7 cm long and wide, peduncled, the flowers apparently in triads on the ultimate branchlets. Young fruit cylindric to somewhat sausage-shaped, up to 1.5 cm long and 7 mm in diameter, nearly mature ones oblong-ellipsoid, about 2.5 cm long, subequally narrowed at both ends, all very hard when dry and brownish-purple in color.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci. 23670 Ramos*, September 4, 1915, in forests on the lower slopes.

The species is perhaps in the same group as *Eugenia crassibracteata* Merr., but is much larger in all respects, has quite differently shaped leaves, and a different inflorescence. The cylindric or sausage-shaped immature fruits, which are very hard when dry, are very characteristic.

MELASTOMATACEAE

MEDINILLA Gaudichaud

MEDINILLA SORSOGONENSIS sp. nov.

Frutex scandens, glaber, ramis ramulisque crassis, acute tetragonis; foliis oppositis, petiolatis, oblongis, acuminatis, basi acutis vel rotundatis, 5-nerviis, usque ad 24 cm longis; inflorescentiis lateralibus, solitariis, umbellatis, breviter pedunculatis, paucifloris, floribus 4-meris, staminibus subaequalibus.

A scandent glabrous shrub apparently of small size, the branches stout, about 1 cm in diameter, acutely 4-angled, not setose at the nodes. Leaves opposite, petiolate, membranaceous when dry, oblong, 16 to 24 cm long, 6 to 8 cm wide, base acute or rounded, apex slenderly acuminate, olivaceous when dry, somewhat shining; nerves all basal, the inner pair more prominent than the outer, the transverse nervules very slender, obscure; petioles 3 to 4 cm long. Inflorescence lateral, solitary, scattered along the stem, consisting of short-peduncled, few-flowered umbels, the peduncles 1 to 1.5 cm long, slender. Flowers 4-merous, usually about 5 in each umbel, their pedicels 1 cm long or less. Calyx obconic, about 7 mm long, the limb produced, truncate. Petals irregularly oblong-obovate, about 12 mm long. Stamens subequal, the lanceolate anthers 10 mm long, curved, acuminate.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23556 Ramos*, August 6, 1915, in the mossy forest.

This species is manifestly closely allied to *Medinilla polillensis* C. B. Rob., which it greatly resembles. That species, however, has prominently 3- or 5-plinerved leaves, while the present one has distinctly 5-nerved ones.

ASTRONIA Blume

ASTRONIA SORSOGONENSIS sp. nov.

Arbor parva, ramulis petiolis subtus foliis ad costa nervisque inflorescentiisque plus minusve ferrugineo-furfuraceis; foliis chartaceis, oblongis, olivaceis, acuminatis, basi acutis, 3-plinerviis vel paene 3-nerviis, usque ad 9 cm longis; paniculis pyramidatis 5 ad 7 cm longis, pedunculatis vel e basi ramosis; capsulis subglobosis, circiter 2.5 mm diametro.

A small tree, the younger parts ferruginous-furfuraceous. Branches grayish or brownish, terete, glabrous, the branchlets densely ferruginous-furfuraceous. Leaves numerous, oblong, chartaceous, olivaceous, somewhat shining, 4 to 9 cm long, 2 to 3 cm wide, equally narrowed to the acute base and to the rather slenderly acuminate apex, the upper surface glabrous, the lower ferruginous-furfuraceous on the longitudinal nerves; nerves 3, the lateral pair prominent, leaving the midrib within 1 or 2 mm of the base; petioles ferruginous-furfuraceous, 5 to 8 mm long. Panicles terminal, pyramidal, peduncled or sometimes branched from the base, up to 10 cm long, more or less ferruginous-furfuraceous. Capsules, globose, about 2.5 mm in diameter, glabrous, the teeth very small.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23699 Ramos*, August 16, 1915 (type); Mount Bagacaua, *Bur. Sci. 23430 Ramos*, August 26, 1915, in forests at the summit, altitude apparently about 1,000 meters.

The species is closely allied to *Astronia acuminatissima* Merr., which it greatly resembles, but is distinguished by its ferrugineous-furfuraceous indumentum and the more nearly basal lateral nerves of its leaves.

ASTRONIA BADIA sp. nov.

Arbor circiter 10 m alta, inflorescentiis dense brunneo-furfuraceo-lepidotis, subtus foliis uniformiter dense brunneo- vel cupreo-lepidotis; foliis longe petiolatis, elliptico-oblongis, usque ad 25 cm longis, acuminatis, basi obscure auriculatis, 5-nerviis, nervis exterioribus tenuibus; paniculis circiter 8 cm longis, e basi ramosis, subcorymbosis; floribus 5-meris, calycis circiter 4 mm diametro.

A tree about 10 m high, glabrous except the inflorescence and the lower surface of the leaves. Branches rather stout, dark colored when dry. Leaves elliptic-oblong, chartaceous, about 25 cm long and 11 cm wide, subequally narrowed to the shortly acuminate apex and to the obscurely auriculate base, the upper surface glabrous, olivaceous, the lower densely and uniformly covered with small, distinct, papyraceous, brown or cupreous scales; nerves 5, basal, the inner pair very prominent, the outer pair slender, all reaching the apex of the leaf, the transverse

nerves slender; petioles 5 to 8 cm long. Panicles terminal, subcorymbose, nearly flat, branched from the base, densely brown-lepidote, the branches few, the lower ones about 6 cm long, the upper ones shorter, ascending. Flowers red, 5-merous, short-pedicelled, the calyx cup-shaped, brown, sparingly lepidote, about 4 mm in diameter, the teeth ovate, acute, less than 2 mm long. Petals suborbicular, when immature about 2.5 mm in diameter.

LUZON, Province of Sorsogon, Lake Polog, *Bur. Sci. 23646 Ramos*, August 28, 1915, in forests.

A species somewhat resembling *Astronia dioica* Merr., from which it is at once distinguished by its very long petioles, the lamina not at all decurrent.

ARALIACEAE

BOERLAGIODENDRON Harms

BOERLAGIODENDRON RAMOSII sp. nov.

Species *B. luzoniense* Merr. affinis, differt inflorescentiis parcissime pubescentibus vix paleaceis, pedunculis lateralibus glabris, ebracteatis.

An erect shrub 1 m high or more, the ultimate branches glabrous, pale, at least 1 cm in diameter. Leaves palmately 7-lobed, up to 27 cm in length, chartaceous, glabrous, suborbicular in outline, the lobes oblong-obovate, coarsely lyrately lobed, distantly and sharply toothed, extending to within 3 to 7 cm of the base, the sinuses rounded, the lobules of the central lobes two or three, of the lower ones one or two, oblong-ovate to triangular, acute or shortly and sharply acuminate; petioles up to 22 cm in length, the basal part with three or four, spirally arranged, coriaceous, narrow, toothed crests. Inflorescence terminal, 8 to 10 cm long and wide, the peduncle stout, about 2 cm long, obscurely paleaceous, the bracts subtending the primary branches lanceolate, up to 2 cm in length; primary branches about fifteen, 2 to 2.5 cm long, slightly pubescent, not paleaceous, each bearing a central, short-peduncled head, and two long-peduncled lateral heads. Sterile flowers of the central head pedicelled, the pedicels about 5 mm long, glabrous or obscurely pubescent, the head subtended by numerous linear to lanceolate bracts and bracteoles, 8 to 13 mm in length, about 10 flowers in each head, the fruits globose, glabrous, 4 to 5 mm in diameter. Peduncles of the lateral heads glabrous, about 2.5 cm long, ebracteate, the heads globose, about 1 cm in diameter, dense, obscurely pubescent, the flowers 25 to 30 in each head, sessile or very shortly pedicelled, about 2 mm long, intermixed with few small scales.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23467 Ramos*, July 29, 1915, in damp forests near the base of the mountain.

A species strongly resembling *Boerlagiodendron luzoniense* Merr., but differing radically in the details of its inflorescence which is nearly glabrous, not densely paleaceous, the peduncles of the lateral heads longer and ebracteate.

DIPLYCOSIA Blume

DIPLYCOSIA LUCIDA sp. nov.

Frutex scandens glaber, ramis ramulisque teretibus; foliis ellipticis, coriaceis, nitidis, usque ad 7 cm longis, apice obtusis vel rotundatis, basi acutis, margine revolutis, integris, nervis utrinque 2 vel 3, adscendentibus, distinctis; floribus axillaribus, binis, longe pedicellatis; fructibus obovoideis, in siccitate circiter 5 mm longis.

An entirely glabrous scandent shrub, the branches and branchlets slender, terete, pale or brownish, smooth. Leaves coriaceous, shining, elliptic, 5 to 7 cm long, 2.5 to 3.5 cm wide, the apex rounded or obtuse, base acute, margins entire, revolute; lateral nerves 2 or 3 on each side of the midrib, rather prominent, ascending, the reticulations lax; petioles about 7 mm long. Flowers in axillary pairs, their pedicels slender, about 1.5 cm long. Corolla glabrous, cylindric, about 3 mm long, the lobes 5, broadly ovate, 0.5 mm long. Stamens 10, the filaments 1.7 mm long, slightly pubescent; anthers about 1 mm long. Fruit black when dry, obovoid, about 5 mm long, the persistent calyx teeth broad, short, apiculate.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23504 Ramos*, August 17, 1915, on trees at the summit, apparently at an altitude of about 1,000 meters.

A species well characterized by being entirely glabrous, by its obtuse or rounded leaves with revolute margins, and by its axillary pairs of long-pedicelled flowers. It somewhat resembles *Diplycosia baclayanensis* Elm., but differs in its leaf characters and in its long pedicels.

MYRSINACEAE

MAESA Forskål

MAESA LONGIPETIOLATA sp. nov. § *Eumaesa*.

Frutex scandens vel suberectus, glaber, ramis ramulisque subteretibus, brunneis; foliis oblongis, chartaceis ad subcoriaceis, in siccitate supra olivaceis, subtus brunneis, usque ad 7 cm longis, apice breviter obscure acuminatis, basi rotundatis, margine obscure undulatis, obscurissime distanter denticulatis, nervis utrinque circiter 4, tenuibus, obscuris, petiolo 1.5 cm longo; inflorescentiis axillaribus, 2.5 ad 4 cm longis, depauperato-paniculatis, sepalis haud lineatis, glabris, late ovatis, obtusis,

persistentibus; fructibus supra basin bracteolis minutis instructis.

A glabrous, apparently scandent shrub, the branches slender, terete, brown, rather smooth. Leaves oblong, firmly chartaceous to subcoriaceous, oblong, 5 to 7 cm long, 2 to 3 cm wide, slightly shining when dry, the upper surface olivaceous, the lower brown, apex shortly and obscurely blunt acuminate, base rounded, margins obscurely undulate and distantly and minutely denticulate; lateral nerves about 4 on each side of the midrib, slender, obscure; petioles slender, about 1.5 cm long. Inflorescence axillary, 2.4 to 4 cm long, sometimes a simple raceme, more often with one or two short branches from the lower part forming a depauperate panicle. Pedicels about 1.5 mm long, the subtending bracts ovate-lanceolate, acute, about 1 mm long. Fruit narrowly ovoid, brown, about 3 mm long, supplied above the base with a pair of small, ovate, persistent bracteoles about 0.5 mm long. Sepals broadly ovate, entirely glabrous, not at all punctate, rounded or obtuse, broadly ovate, about 1 mm long.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23358 Ramos*, August 5, 1915, in forests near the summit.

The alliance of this species is manifestly with the widely distributed and somewhat variable *Maesa denticulata* Mez, from which it can at once be distinguished by its smaller, much narrower, differently shaped leaves, which are obscurely undulate and denticulate and brownish beneath when dry, and its shorter inflorescences.

SAPOTACEAE

SIDEROXYLON Linnaeus

SIDEROXYLON SARCOCARPUM sp. nov.

Arbor, alta, ramulis subtus foliisque dense adpresse ferrugineo-chryseo-pubescentibus; foliis oblongis vel elliptico-oblongis, usque ad 23 cm longis, subcoriaceis, acuminatis, basi acutis vel decurrentibus, utrinque nitidis, in siccitate pallidis, nervis utrinque 12 ad 14, subtus valde prominentibus; floribus lateralibus, fasciculatis; fructibus carnosis, glabris, ellipsoideis vel obovoideis, junioribus circiter 2 cm longis.

A tall tree, the leaves beneath prominently and densely pubescent with short, appressed, golden-ferruginous hairs. Branches grayish, rather stout, glabrous, the younger parts densely appressed ferruginous-pubescent, the very young leaves densely ferruginous-pubescent throughout. Leaves oblong to oblong-elliptic, subcoriaceous, rather pale when dry, 12 to 23 cm long, 4 to 9 cm wide, the upper surface entirely glabrous,

apex shortly acuminate, base narrowed, acute or somewhat decurrent; lateral nerves 12 to 14 on each side of the midrib, very prominent on the lower surface, slightly curved, obscurely anastomosing near the margin, the reticulations distinct; petioles 2 to 3 cm long, pubescent. Flowers on the branches below the leaves, fascicled, in young fruit the pedicels rather stout, appressed pale- or ferruginous-pubescent, about 8 mm long. Sepals suborbicular, coriaceous, rounded, about 5 mm in diameter. Immature fruits glabrous, wrinkled, shining, dark-colored when dry, subglobose to ellipsoid or obovoid, at least 2 cm in length, apparently soft and fleshy.

LUZON, Province of Sorsogon, Mount Lalao, *Bur. Sci. 23415 Ramos*, August 10, 1915, in forests near the summit of the mountain.

Quite different from the other known Philippine species, well characterized by its rather large leaves which are densely appressed-pubescent beneath with ferruginous-golden hairs. It may be as closely allied to *Sideroxylon foxworthyi* Elm. as to any other species, but its indumentum is entirely different in color and in character from that of the latter species.

EBENACEAE

DIOSPYROS Linnaeus

DIOSPYROS ULO sp. nov.

Arbor circiter 15 m alta, glabra vel subglabra, ramis ramulisque tenuibus teretibus; foliis chartaceis, oblongis, pallidis, usque ad 12 cm longis, utrinque subaequaliter angustatis, acuminatis, basi acutis, nervis utrinque 6 vel 7, tenuibus; fructibus globosis, in siccitate crustaceis, circiter 5 cm diametro, extus leviter adpresse pubescentibus, calycis persistentibus, circiter 1.5 cm diametro; seminibus 8, brunneis, 2.5 cm longis, albumine aequabile.

A tree about 15 m high, glabrous or nearly so (flowers not seen), the branches and branchlets slender, terete, light-gray. Leaves chartaceous, rather pale when dry, slightly shining, oblong, 7 to 12 cm long, 2.5 to 4.5 cm wide, subequally narrowed to the acute base and to the acuminate apex, eglandular; lateral nerves 6 or 7 on each side of the midrib, slender, anastomosing, the reticulations slender, lax; petioles 3 to 4 mm long. Fruits globose, about 5 cm in diameter, 8-celled, 8-seeded, black when dry, pericarp crustaceous, with subpersistent scattered, appressed, short, grayish hairs. Seeds about 2.5 cm long, brown, triangular in cross section, the albumen uniform, very hard.

LUZON, Province of Cagayan, Luzon, Lal-lo, *For. Bur. 23243 Barros*, July 21, 1914, in forests at an altitude of about 30 meters; locally known as *ulo*.

Here I also refer tentatively *Bur. Sci. 23413 Ramos*, from Mount Lalao, Province of Sorsogon, Luzon, which differs from *Diospyros ulo* as above described in its leaves being brownish when dry, more strongly shining, the very young branchlets and petioles slightly pubescent, and the immature fruits entirely glabrous and shining, brown, not black in color, when dry. It is possible that this Sorsogon plant represents a distinct species, but additional material is desirable before attempting to separate it.

SYMPLOCACEAE

SYMPLOCOS Jacquin

SYMPLOCOS ACUMINATISSIMA sp. nov. § *Bobua.*

Arbor glaberrima vel inflorescentiis parce pubescentibus; foliis lanceolatis, longe tenuiter caudato-acuminatis, usque ad 11 cm longis, chartaceis ad subcoriaceis, nitidis, basi acutis, margine irregulariter undulato-crenatis, nervis utrinque 8 ad 10, distantibus, anastomosantibus; racemis in axillis superioribus, solitariis, usque ad 6 cm longis, junioribus leviter pubescentibus, vetustioribus glabris; fructibus anguste ovoideis, obtusis, circiter 8 mm longis.

A tall tree, quite glabrous or the inflorescence at anthesis and in young fruit sparingly pubescent. Branches slender, terete, smooth, brownish, the branchlets similar but more slender. Leaves numerous, somewhat crowded on the ultimate branchlets, lanceolate, 7 to 11 cm long, 1 to 2.5 cm wide, yellowish green when dry, chartaceous to subcoriaceous, shining, gradually narrowed into the long, slender, blunt, caudate-acuminate apex, the acumen up to 3 cm in length, the base acute, the margins irregularly undulate-crenate; lateral nerves 8 to 10 on each side of the midrib, slender, anastomosing, the reticulations lax; petioles 1 to 1.7 cm long. Racemes in the upper axils, mostly solitary, simple, up to 8 cm in length, when young appressed-pubescent, in age perfectly glabrous. Fruit narrowly ovoid, terete, smooth, obtuse, brownish when dry, about 8 mm long.

LUZON, Province of Sorsogon, Bulusan Volcano, *Bur. Sci. 23690 Ramos* (type), September 5, 1915, in the mossy forest. Here I also refer *Bur. Sci. 23333 Ramos* from Mount Bagacaua, Sorsogon; perhaps *Wenzel 888*, determined as *S. villarii* Vid., also is referable here.

The alliance of this species is with *Symplocos villarii* Vid. (*S. polyandra* Brand, but *not Guettarda polyandra* Blanco), from which it is distinguished by its lanceolate, very long, and slenderly caudate-acuminate leaves.

GESNERIACEAE

CYRTANDRA Forster

CYRTANDRA SORSOGONENSIS sp. nov.

Frutex subscandens, partibus junioribus subtus foliis ad costa nervisque petiolis floribusque densissime longe ferrugineo-

villosis; foliis longe petiolatis, oblongis ad oblongo-ellipticis, usque ad 13 cm longis, acutis, serratis, basi obtusis ad rotundatis, nervis utrinque 10 ad 12, subtus valde prominentibus; floribus circiter 2 cm longis, calycibus valde inflatis, 5-lobatis, lobis ovatis, 4 ad 5 mm longis.

A subscandent shrub, very prominently villous with dense, long, soft, brown or ferruginous hairs. Branches pale-gray, terete, about 7 mm in diameter, the younger parts very densely villous as are the petioles, inflorescences, flowers, and midrib and nerves on the lower surface of the leaves. Leaves oblong to oblong-elliptic, subcoriaceous, 9 to 13 cm long, 3.3 to 6 cm wide, those of each pair somewhat unequal in size, the upper surface nearly black when dry, glabrous or nearly so, the lower brownish in color, densely villous on the midrib, nerves, and somewhat so on the reticulations, the apex acute, base obtuse to rounded, margins distantly serrate; petioles of the larger leaf of each pair up to 6 cm in length, of the smaller one 2 to 3 cm. Flowers axillary, apparently fascicled; pedicels, calyx, and corolla externally very densely and softly villous; pedicels 6 to 8 mm long. Calyx inflated, up to 1 cm in diameter, about 1.5 cm long, ovoid, the lobes ovate, acute, 4 to 5 mm long, outside very densely villous. Corolla cylindric, 2 cm long, densely villous, the lobes orbicular-ovate, subequal, spreading or somewhat recurved, about 2 mm long. Anthers 2 mm long. Ovary narrowly ovoid, glabrous; style elongated, appressed-hirsute.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23318 Ramos*, August 18, 1915, on trees at the summit.

A most characteristic species, readily distinguished from the numerous Philippine forms by its long-petioled leaves, its very dense, brown or ferruginous indumentum, and its inflated calyces. Perhaps allied to *Cyrtandra villosissima* Merr., but entirely different from that species.

RUBIACEAE

GARDENIA Linnaeus

GARDENIA OBSCURINERVIA sp. nov.

Frutex scandens, glaber, foliis anguste oblongis, coriaceis, nitidis, acuminatis, basi acutis, usque ad 14 cm longis, nervis utrinque circiter 10, subtus subobsoletis; floribus axillaribus, fasciculatis, sessilibus, 5-meris, fasciculatis, bracteis ovatis 6 ad 7 mm longis persistentibus suffultis, calycibus obovoideis, cylindraceis, circiter 5 mm longis, corolla cylindracea, elongata, tubo circiter 10 cm longo, lobis lanceolatis, 4 ad 5 cm longis.

A glabrous scandent shrub, the branches stout, rugose when

dry, terete or somewhat angled. Leaves narrowly oblong or oblong-lanceolate, coriaceous, brittle, blackish when dry, shining, 12 to 14 cm long, 2.5 to 4.5 cm wide, acuminate, base acute; lateral nerves obscure, slender, about 10 on each side of the midrib, visible on the upper surface but obsolete or nearly so on the lower surface, reticulations obsolete; petioles 2 to 2.5 cm long; stipules about 4 mm long. Flowers large, white, fragrant, 5-merous, sessile, fascicled, axillary, 3 to 5 in each fascicle, the fascicles subtended by several, imbricate, triangular-ovate, acute to obtuse, submembranaceous, prominently nerved, 6 to 7 mm long bracts. Calyx tube terete, obovoid, glabrous, about 4 mm long and wide, the lobes ovate, rounded, minutely ciliate on the margins. Corolla tube slender, cylindric, about 10 cm long and 2 to 3 mm in diameter, the lobes lanceolate, spreading or recurved, acute or acuminate, 4 to 5 cm long and about 5 mm wide.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23492 Ramos*, August 1, 1915.

This most striking and characteristic species does not resemble any species of the genus known to me, and is strongly characterized by its obscurely nerved, coriaceous leaves, and very long, slender, fascicled, axillary, sessile flowers, the fascicles subtended by several imbricate persistent bracts.

MORINDA Linnaeus

MORINDA PLATYPHYLLA sp. nov.

Frutex alte scandens, glaber; foliis ellipticis, usque ad 18 cm longis, in siccitate subnigris, nitidis, apice acuminatis, basi acutis, nervis utrinque circiter 10, subtus valde prominentibus, subtus in axillis leviter barbatis; inflorescentiis terminalibus, umbellatis, capitulis numerosis, 25 ad 30, fructibus globosis, longe pedunculatis, circiter 1 cm diametro, pedunculis usque ad 4 cm longis.

A scandent shrub, apparently of large size, glabrous except the slightly bearded axils of the veins on the lower surface of the leaves. Branches stout, wrinkled when dry, pale-brownish, somewhat 4-angled, 6 to 8 mm in diameter. Leaves elliptic, blackish when dry, subcoriaceous, shining, 15 to 18 cm long, 7 to 9 cm wide, acuminate, base somewhat acute; lateral nerves about 10 on each side of the midrib, prominent on the lower surface, the ultimate reticulations distinct, rather close; petioles about 3 cm long, black. Inflorescence terminal, umbellate, from 25 to 30 heads in each umbel, the heads, in fruit, black when dry, globose, about 1 cm in diameter, each composed of 25 or more individual fruits grown together in a somewhat fleshy mass, the peduncles up to 4 cm in length.

LUZON, Province of Sorsogon, Mount Lalao, *Bur. Sci. 23414 Ramos*, August 9, 1915, in forests near the summit of the mountain.

A species apparently belonging in the same group as the Malayan *Morinda jackiana* Korth., but quite glabrous. It is entirely different from all the other described Philippine forms.

TIMONIUS DeCandolle

TIMONIUS OLIGOPHLEBIUS sp. nov.

Arbor circiter 6 m alta, ramulis foliis inflorescentiisque plus minusve ferrugineo-pubescentibus; foliis ellipticis ad obovatis, subcoriaceis, in siccitate brunneis, usque ad 8 cm longis, nitidis, utrinque rotundatis vel obtusis, nervis utrinque 4 vel 5; inflorescentiis axillaribus, solitariis, circiter 6 cm longis, longe pedunculatis, furcatis; fructibus sessilibus, ellipsoideis vel late ovoideis, circiter 6 mm longis.

A tree about 6 m high, the branchlets, leaves, and inflorescence more or less pubescent with short brownish hairs. Branches slender, pale-grayish or brownish, terete, glabrous, the younger ones with appressed ferruginous hairs. Leaves elliptic to somewhat obovate, brown and somewhat shining when dry, 6 to 9 cm long, 3.5 to 5 cm wide, rounded at both ends, or sometimes obtuse, the base rarely acute, somewhat ferruginous-pubescent on the midrib and nerves on both surfaces, more especially on the lower surface; lateral nerves 4 or 5 on each of the midrib, prominent on the lower surface, curved-ascending, anastomosing, the reticulations few, lax; petioles about 1 cm long, ferruginous-pubescent. Inflorescence axillary, solitary, forked at the apex of the long peduncle, the peduncle 3 to 4 cm long, the branches about 2 cm in length, ferruginous-pubescent. Fruits ellipsoid or broadly ovoid, sessile, about 6 mm long, glabrous or with few scattered ferruginous hairs, one at the fork and 4 or 5 arranged in a single row on each of the two branches.

LUZON, Province of Sorsogon, Mount Kililibong, *Bur. Sci. 23367 Ramos*, August 17, 1915, in forests near the summit, apparently at an altitude of about 1,000 meters.

The alliance of this species is with *Timonious trichophorus* Merr., of Leyte, from which it differs in its differently shaped, fewer nerved leaves and other characters.

MUSSAENDA Linnaeus

MUSSAENDA MULTIBRACTEATA sp. nov.

Arbor parva, prominente hirsuta; foliis in paribus subaequalibus, membranaceis, ovatis, usque ad 20 cm longis, acuminatis, basi attenuatis, nervis utrinque circiter 11, prominentibus; inflorescentiis terminalibus, dense hirsutis, multibracteatis, bracteis lanceolatis, hirsutis, subpersistentibus, ad 13 mm longis;

floribus 5-meris, extus dense hirsutis, corollae tubo 3 cm longo, sepalis late lanceolatis, circiter 2 cm longis, persistentibus, sepala foliacea circiter 7 cm longa.

A shrub or small tree, 3 to 4 m high, most parts prominently hirsute with stiff, spreading, pale-brownish hairs, the branches terete, brown. Leaves in equal or subequal pairs, membranaceous, olivaceous, ovate, 10 to 20 cm long, 6 to 10 cm wide, the midribs and lateral nerves of both surfaces prominently hirsute with spreading hairs, apex acuminate, base equilateral, attenuate; lateral nerves about 11 on each side of the midrib, prominent; petioles proper 1 to 2 cm long, hirsute. Panicles terminal, ample, prominently spreading-hirsute, up to 20 cm in diameter, with numerous, crowded, subpersistent bracts and bracteoles, the flowers 5-merous, somewhat crowded on the ultimate branchlets; bracts and bracteoles similar, lanceolate, acuminate, hirsute, 6 to 13 cm long, the former sometimes cleft or trifid with lateral lobes much smaller than the central one. Calyx tube narrowly ovoid, densely hirsute with stiff, spreading, 2 mm long hairs, 8 to 9 mm long, the lobes persistent, broadly lanceolate, acuminate, hirsute outside, sparingly pubescent inside, about 2 cm long and 6 mm wide, the foliaceous one ovate to elliptic ovate, about 7 cm long and 4 cm wide, sparingly hirsute, acute or obscurely acuminate, base acute, prominently nerved and reticulate. Corolla tube cylindric, rather stout, densely hirsute outside, 3 cm long, the limb about 13 mm in diameter, spreading or recurved, the lobes broadly ovate, glabrous inside, obtuse or acute, about 5 mm long.

LUZON, Province of Sorsogon, Mount Pocdal, *Bur. Sci. 23585 Ramos*, August 10, 1915, on damp slopes in open forests. Apparently also referable here is a fruiting specimen from the same mountain, *Bur. Sci. 23715 Ramos*, collected August 6, 1915.

The alliance of this species is with *Mussaenda philippinensis* Merr., in the section with persistent sepals. It differs from that species, however, in its more prominent indumentum, its much broader bracts and bracteoles, broader persistent sepals, stouter, densely hirsute, longer corolla tube, broader limb, and longer corolla lobes.

THE PHILIPPINE JOURNAL OF SCIENCE, C. BOTANY.
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A NEW SPECIES OF HYDNOCARPUS

By C. DECANDOLLE
(*Geneva, Switzerland*)

In November, 1914, Mr. T. Alcala of Daraga, Albay Province, Luzon, submitted to the Bureau of Agriculture in Manila, some rather large detached fruits, accompanied by an inquiry as to whether or not they were edible. The fruits, which resembled nothing that had previously been received in the herbarium of the Bureau of Science, were identified by me as belonging to the *Flacourtiaceae*. A request was then sent to Mr. Alcala, that an attempt be made to secure flowering material of the plant. To this request Mr. Alcala courteously complied, and in February, 1915, collected flowering specimens of the plant which he transmitted to Manila. This material reached Manila after my departure for the United States, and in view of the possible special interest of the plant, a portion of it was transmitted to Dr. C. DeCandolle in Geneva for identification. In view of the fact that chaulmoogra oil, which is produced by Asiatic representatives of the closely allied genus *Taraktogenos*, and perhaps by representatives of the genus *Hydnocarpus*, it was thought that this Philippine form, having numerous large seeds, might prove to be of some value, and that its oil might possibly have the same curative value in the treatment of leprosy as is found to be the case with the true chaulmoogra oil.—E. D. M.

FLACOURTIACEAE

HYDNOCARPUS Gaertner

HYDNOCARPUS ALCALAE C. DC. sp. nov.

Monoicus, foliis breviter petiolatis, glabris, limbo oblongo-ovato integro basi inaequilatera latere latiore rotundato angustiore attenuato apice obtusiuscule acuminato, penninervio, nervis lateralibus adscendentibus utrinque 7; racemo simplici glabro folium superante dissite cymuligero, floribus hermaphroditis longe pedicellatis, sepalis 5 ovatis glabris, petalis 5 quam sepala paullo brevioribus ellipticis basi truncatis apice margine intusque breviter hirsutis, squamis basi petalorum affixis oblongis apice acute apiculatis extus dense et breviter hirsutis; staminibus

5 petala fere aequantibus, filamentis tenuibus antheris extrorsis; ovario oblongo-obovato dense et albescente hirsuto, stigmate sessili radiatim 5-partito, laciniis carnosis deorsum reflexis apice dilatatis emarginatisque, placentis 5 parietalibus dense ovuliferis, fructu magno obovoideo glabro seminibus oblongo-ellipticis.

Arbor 4 ad 5 m alta trunco 50 ad 60 cm ambitu ramis glabris. Folia alterna. Limbus in sicco firmus, usque ad 25 cm longus et 11 cm latus, petiolus 1 cm longus. Racemus floriferus 54 cm longus. Pedicelli 2.5 cm longi. Sepala 1.2 cm longa, 0.7 cm lata. Petala 0.8 cm longa 0.5 cm lata. Antherae 0.2 cm longae. Fructus in sicco atrorubescens 23 cm longus et usque ad 14.5 cm latus. Semina 80 ad 90 usque 3 cm longa.

LUZON, Province of Albay, in damp ravines in Daraga and in the Camilig Mountains, *T. Alcala*, in herb. Manila and DeCandolle.

The vernacular name is *dudu-dudu*, and regarding the plant Mr. Alcala writes: "It is said that the oil extracted from the seeds is a good cure for wounds. It is generally believed to be poisonous, and when I ate six or eight of the boiled seeds I had a slight sickness; however, many children eat them raw without the slightest ill effect."

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MISCELLANEOUS NEW FERNS

By EDWIN BINGHAM COPELAND [1]

(From the College of Agriculture, University of the Philippines, Los Baños, P. I.)

ATHYRIUM RIDLEYI Copel. sp. nov.

Filix insignis gregis A. Swartzii (Bl.) Copel.; rhachi inerme, in sulcis minute pilosa; pinnis alternantibus, stipitatis, brevi-falcato-acuminatis, basi truncatis, deorsum grosse crenato-serratis dentibus obtusis vel rotundatis, fere 40 cm longis, plusquam 10 cm latis; venulis 10–12 paribus, irregulariter anastomosantibus et medio inter venas areolas plures steriles includentibus; indusio angustissimo.

PAHANG, *Ridley 13970.*

Javan ferns referable to *Athyrium accedens* or *A. Swartzii* rarely have additional areolæ, included between the regular rows, but are never ample in a measure comparable to this fern. *Digrammaria robusta* Fée, treated by Van Alderwerelt and Christensen as included in *Diplazium proliferum*, was described by Fée from Bourbon material as generically distinct because only the lowest veins unite.

MICROLEPIA RIDLEYI Copel. sp. nov.

Fronde grande, bipinnata, rhachibus sub lente minute pubescentibus; pinnis ca. 70 cm longis, fere 20 cm latis, brevistipitatis, acuminatis; pinnulis subsessilibus, basibus perobliquis, acuminatis, apicibus rectis vel subfalcatis, inciso-crenatis, costa deorsum indusiisque puberulentibus, aliter glabris, membranaceis; lobis ca. 8 mm latis, truncatis, integris vel crenulatis; venis inconspicuis; soris in lobo magno basale acroscopico pluribus, aliter infra incisiones solitariis; indusio semicyathiforme.

PERAK, *Ridley 14200.*

Different from *Microlepia platyphylla* (Don) J. Sm. in texture, inconspicuous veins, hairy indusia, and most essentially in the form of the indusium. Don's diagnosis of *Davallia platyphylla* is too brief to permit certain discrimination. Hooker [2] describes *D. lonchitidea* Wall. as identical with it; his figure is that of a fern very similar to *M. Ridleyi*, with sessile pinnules, while the text says "primary and secondary pinnules much petioled." I believe that both names, *platyphylla* and *lonchitidea*,

[1] Dean of the College of Agriculture, and professor of plant physiology, University of the Philippines.

[2] Sp. Fil. 1: 173.

apply to the plant figured by Beddome,[3] which is very distinct. It has naked indusia, broader than long, usually cordate, and with free sides.

ANGIOPTERIS MADAGASCARIENSIS De Vriese.

MADAGASCAR, *Humblot 546*.

De Vriese[4] concludes his description with "An fortasee potius evolutionis status?" That his specimen was decidedly immature is shown by several of his notes; especially, "Sori . . . nigri, propter indusium quo teguntur, haud bene conspiciendi." The character on which he lays most emphasis, the very thin and pellucid pinnule, depends on the immaturity.

Humblot's specimen is mature, and permits the following corrections to be made in the description:

Rachis pale brown and, like the costa, nearly naked; pinnules up to 20 cm long, lanceolate, dentate with moderately serrate tip, papyraceous, subpellucid, veins opaque, conspicuous, false veins present, but inconspicuous and reaching less than halfway to the costa; sori 2 mm from the margin, 1.5 to 2 mm long, deep brown, on the outside almost black because of the dried and adherent indusium, of which there are no loose fragments; sporangia 10 to 15, or rarely 18. The pinnules are rather long-stalked (3 mm); the lowest has a stalk 2 cm long, and bears 2 free leaflets on the lower side—as sometimes observed in other species with very ample fronds. As these deviations from De Vriese's description are all such as a mature frond could be expected to show in comparison with an immature one, I have no doubt that the plants are the same.

ELAPHOGLOSSUM PARVUM Copel. sp. nov.

Rhizomate breve, suberecto, paleis ovatis ferrugineis decidue et sparsiter ciliatis occulto; stipitibus confertis, frondium sterilium ca. 2 cm altis applanatis squamosis sursum mox glabrescentibus, frondis fertilis 6 cm alto; fronde sterile oblanceolata, obtusa, deorsum sensim angustata, coriacea, angustissime deflexo-marginata, glabra vel glabrescente, 10–15 cm alta, 2 cm lata; venis obliquis, occultis, costa utraque facie applanata; fronde fertile 6 cm alta, lanceolata.

CHINA, Fokien Province, coll. on Mr. Dunn's expedition to central Fokien, 1905, *Hongkong Herbarium 3821*.

This has the form of a very small *E. decurrens*, but utterly different paleae.

ELAPHOGLOSSUM MACGREGORI Copel. sp. nov.

Rhizomate crasso, repente, paleis 1–1.5 cm longis linearibus integris rigidis castaneis nitidis dense obtecto; stipitibus confertis, frondium sterilium 1–4 cm altis, applanatis, alatis, stramineis, nudis, frondis fertilis fere 10 cm alto sursum solummodo alato; fronde sterile 20–25 cm alta, 2–3 cm lata, subacuminata, oblanceolata, deorsum sensim ad alam stipitis angustata, coriacea, inferne sub lente pilis stellatis sparsiter ornata, angustissime cartilagineo-marginata; venis obliquis, immersis, in-

[3] Ferns of Southern India, *Pl. 130*.

[4] Monogr., 23–24.

conspicuis, costa utraque facie applanata; fronde fertile 10 cm longa, 2.5 cm lata, basi abrupte cuneata.

LUZON, Mountain Province, Polis Mountain, *Bur. Sci. 19780 R. C. McGregor.*

Most nearly related to *E. callifolium* (Bl.) Moore, but very much smaller and with almost sessile sterile fronds. *Elaphaglossum callifolium* is not known north of Negros.

ELAPHOGLOSSUM BASILANICUM Copel. sp. nov.

E. decurrenti (Bl.) Moore affine, frondibus sterilibus subsessilibus, acutis, oblanceolatis, inferne praecipue costam et marginem secus squamis laceratis sat dense vestitis, costa inferne carinata.

BASILAN, *Bur. Sci. 16232 Reillo.*

Very distinct from other species, but closely related to *E. decurrens*, the scales both on the rhizome and scattered over the nether surface of the frond being of the same peculiar types. The denser scales along costa and margin are larger and less completely dissected. All fronds, even the oldest, remain decidedly scaly. The sterile fronds are narrower than those of *E. decurrens*, and not quite so coriaceous. The color is a rather light reddish-brown.

LYGODIUM VERSTEEGII Christ in Rés. de l'Exp. Sci. Néerl. à la Nouv. Guinée. 8 (1910) 163.

LUZON, Tayabas Province, Guinayangan, *Bur. Sci. 20821 Escritor.*

As I have previously noted,[5] New Guinea plants believed to represent this species are far from uniform. These Philippine specimens are not quite identical with any I have from New Guinea, but agree with Christ's brief description rather better than do the latter.

LOMAGRAMMA BIPINNATA Copel. sp. nov.

Fronde 40 cm alta, ovata, bipinnata, rhachi castaneo-straminea, sparsissime et minute paleata, glabrescente; pinnis lanceolatis, acuminatis; pinnulis valde auriculatis, basiscopice excisis, super auriculam lanceolatis, acutiusculis, serratis, herbaceis, glabris, venulis liberis simplicibus; pinnulis fertilibus modo contractis, sporangiis apices versus more Acrostichi paginam complentibus, deorsum saepe in soros venas terminates nudos congregatis.

SAMAR, Cauayan Valley, *Bur. Sci. 17515 Ramos*, scandent in dry forest, alt. 100 m.

Aside from the incomplete dimorphism, this is distinguished from *L. articulata* (J. Sm.) Copel. most evidently by the much narrower pinnules. In the moderate specialization of the fertile frond this differs decidedly from any other *Lomagramma*, and for this reason it appears to be the most primitive species of the genus and the most likely to indicate relationships and origin. The appearance of the sterile frond is decidedly that of *Polystichum*, but the rhizome is that of typical *Lomagramma*, which, incidentally, is not really naked. It bears a fine, sparse pubescence, suggesting ultimate descent from *Dennstaedtia* rather than from *Dryopteris*.

[5] Philip. Journal Sci. 6 (1911) Bot. 68.

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THE GENUS LOXOGRAMME

By EDWIN BINGHAM COPELAND
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FOUR PLATES

Loxogramme, as the name of a group of ferns, originated with Blume [1] who used it for a subgenus of *Antrophyum.* In discussing the affinity (a curious expression in pre-Darwinian science) of *Antrophyum,* he points out a resemblance to *Grammitis,* especially to the species (now known as *Polypodium*) with coriaceus fronds and the sori oblique to the costa, and continues: "Plures adeo *Grammitides* ut sectionem propriam, a soris obliquis nomine *Loxogramme* (a λόζος obliquus et γραμμή linea) insignitam, subjungimus *Antrophyis.*"

As a generic name, *Loxogramme* dates from Presl,[2] with the following diagnosis. "Venae internae, tenuissimae, ramosissimae, venulisque in maculas hexagonoideas elongatas inaequales anastomostantes et reticulam laxam efficientes. Sori dorso venae lateralis longioris unius aut duarum supra-positarum inserti, lineares, elongati, crassi, obtusi." He adds that the rhizome is creeping; the fronds coriaceous, simple and entire, and the sori immersed, in the upper part of the frond.

The first species listed by Blume is *Antrophyum lanceolatum,* the type of which is *Grammitis lanceolata* Swtz. It is particularly fortunate that Swartz figured this fern himself [3] for Schkuhr, to whom we turn for figures of many illustrations of Swartz's species, has in this case figured a different fern, not belonging in the same genus, under this name. Blume in turn gives an excellent plate of his fern, which is still another species, but this time at least a *Loxogramme.* Presl also presents a figure, to illustrate the generic character (l. c. *Tab. IX, Fig. 8*), and labels it *L. lanceolata;* but it is the *Antrophyum lanceolatum* of Blume, not the *Grammatis lanceolata* of Swartz.

The first species listed by Presl is *Loxogramme coriacea* [*Grammitis coriacea* Kaulf. in Spreng. Syst. Veg. 4 (1827) 71].

[1] Flora Javae 2 (1828) 73.
[2] Tentamen Pteridographiae (1836) 214.
[3] Synopsis Filicum. *Plate I, fig. 4.*

Grammitis coriacea Kaulf is described as differing from *G. lanceolatea* Sw., in being *acutiuscula* instead of *acuminata*, and with sori *linearibus elongatis* instead of *costae contigüis subobliquis*. The type locality is the same for both: "Ins. Mascaren." The two are now treated by all authors as identical.

LOXOGRAMME (Bl.) Presl

To Presl's diagnosis, the following addition is essential: Genus ab Eupolypodii section e frondibus simplicibus (Gramittide auct. plur.) derivatum. In this section, elongate sori, approaching the type of *Loxogramme*, are found, notably in **Polypodium magellanicum** (Desv.) [*Grammitis magellanica* Desv. Berl. Mag. 5 (1811) 313; *P. Billardieri* (Willd.) C. Chr., non R. Br., best known as *P. australe* Mett., non Fée], and less conspicuously in *P. dolichosorum* Copel. and many other species. In the same group the occasional anastomosis of veins is far from rare in species or individuals with notably wide fronds.

The genus is typically Malayan, extending outward as far as Africa, Japan, and Polynesia. It is supposed to include also a Mexican species, *L. Salvinii* (Hooker) Maxon. I have included this in the key to the species, having no valid reason for not doing so. By diagnosis, it is certainly a *Loxogramme*, and it has altogether the appearance of one. Still, I suspect that a study more careful than I have been able to give to it and the *Eupolypodia* of the same region will show that it has had a separate origin in the parent group, and must therefore not be included in the same daughter genus.

Key to the species.

1. **Fronds very dimorphous.**
   2. **Fertile frond narrowly linear** ..... **L. dimorpha Copel.**
   2. **Fertile frond linear-oblong** ..... **L. conferta Copel.**
1. **Fronds somewhat dimorphous.**
   2. **Sori parallel to costa or nearly so** ..... **L. paltonioides Copel.**
   2. **Sori moderately spreading** ..... **L. iridifolia (Christ) Copel.**
1. **Fronds uniform.**
   2. **Fronds lanceolate (broadest below the middle)** ..... **L. Brooksii Copel.**
   2. **Fronds linear.**
      3. **Under 20 cm tall** ..... **L. parallela Copel.**
      3. **Over 25 cm tall** ..... **L. linearis Copel.**
2. **Fronds linear-oblong, stipitate, small** ..... **L. africana Copel.**
2. **Fronds oblanceolate, broadly or narrowly.**
   3. **Fronds 1 to 2 cm broad.**
      4. **Fronds opaque.**
         5. **Sori costular** ..... **L. lanceolata (Sw.) Presl.**
         5. **Sori divergent.**
            6. **Stipitate** ..... **L. Fauriei Copel.**
            6. **Decurrent** ..... **L. malayana Copel.**

4. Fronds pellucid..... **L. Salvinii (Hook.) Maxon.**
3. **Fronds more ample.**
4. **Fronds narrowed to the base.**
5. **Stipes short or none.**
6. **Costa most prominent above**..... **L. blumeana Presl.**
6. **Costa most prominent below**..... **L. involuta (Bl.) Presl.**
5. **Stipes ±10 cm long**..... **L. grandis (Racib.) Copel.**
4. **Fronds abruptly narrowed at base**..... **L. Forbesii Copel.**

LOXOGRAMME LINEARIS Copel. sp. nov.

Rhizomate repente, 2 mm crasso, paleis griseo-castaneis lanceolatis 3 mm longis acutis vel acuminatis vestito; stipitibus proximis vel subremotis, validis, atropurpureis, nitidis, 3–6 cm altis; frondibus 25–30 cm altis, 10–15 mm latis, acuminatis, coriaceis, glabris, costa praecipue superne praestante; soris angulo acuto cum rhachi positis, margine remotis, imbricatis, linearibus, saepius ca. 25 mm longis.

FORMOSA, Arisan, alt. 2,500 m, in rupibus, *Faurie 959*, Junio, 1914.

Between *L. parallela and L. Faurie*, and more like the former, from which it differs in being larger throughout and in the less caudate but broader paleae.

LOXOGRAMME AFRICANA sp. nov.

Rhizomate late repente, 1.2 mm crasso, more generis paleaceo; stipitibus ca. 2 cm distantibus, usque ad alam decurrentem laminae 3 cm altis; fronde 10–15 cm alta, ±15 mm lata, linearioblonga, sursum abrupte acuta vel subacuminata, deorsum ad alam brevem angustata, subcoriacea, opaca; areolis usque ad 7 inter costam et marginem; soris 7–10 mm longis, latis, subimmersis, superne haud praestantibus, costam prope et ea subparallelis, rarius imbricatis.

ANGOLA, Pungo-Andongo, Mechow's expedition *No. 142*, distributed as *Polypodium Loxogramme* Mett., coll. in 1879. This differs from *L. lanceolata* (Sw.) Presl in the shape of the frond, which has an almost uniformly broad central part; the texture is thicker, and the stipe much longer. *Gymnogramme abyssinisa* Baker seems to be *L. lanceolata* rather than this species.

LOXOGRAMME FAURIEI Copel. sp. nov.

Rhizomate repente, 1–2 mm crasso, lignoso, paleis lanceolatis acutis vel acuminatis plerisque deciduis apud baseos stipitum persistentibus castaneis vestito; stipitibus 3–5 cm altis, validis, teretibus vel sursum applanatis; fronde 15–30 cm alta, oblanceolata vel lineari-oblanceolata, acuminata, deorsum sensim angustata, coriacea, glabra, siccante interdum subinvoluta; soris rectis, patentibus, imbricatis, linearibus, ad marginem fere attingentibus.

FORMOSA, Bunkihiyo, alt. 1500 m, in arboribus, *Faurie 405.*

This is the so-called *L. lanceolata* of Japan, of which I have in hand specimens from Nippon and Quelpaert. It differs from real *L. lanceolata* in the paleae, in being more coriaceous, and most conspicuously in the sori. From *L. malayana*, it differs most notably in not being winged to the base; and the fronds are more scattered and more coriaceous. In texture it approaches *L. involuta.*

LOXOGRAMME MALAYANA Copel. nom. nov.

Antrophyum lanceolatum Blume, Enumeratio (1828) 117; Flora Javae 2: 84, *Tab. 36,* non *Grammitis lanceolata* Sw.

Blume's description and plate in "Flora Javae" are complete and make a new diagnosis superfluous. *L. lanceolata* (Sw.) Presl is a plant described from Bourbon and found in East equatorial Africa. It is represented, for instance, by No. 9 of Rosenstock's Filices Africae Orient. Germ., collected by Daubenberger on Kilimanjaro. Its sori are costal and much less spreading, and the frond is stipitate and has its broadest part farther from the apex. *L. malayana* is decidedly taller, broadest near the tip, then less acuminate, and winged nearly or quite down to the insertion on the rhizome. The sori are spreading, and imbricate when in full fruit, and may reach nearly to the margin. Mettenius (Polypodium No. 216) has described the Javan plant as *Polypodium Loxogramme,* but that name must probably be held as fixed by his citations of synonymy and therefore as itself applying to the real *L. lanceolata.*

EXPLANATION OF THE PLATES

[Photographs by Cortes, Bureau of Science.]

PLATE I

FIG. 1. *Loxogramme malayana* Copel., from *Elmer 6276*, Benguet.
2. *Loxogramme lanceolata* (Sw.) Presl, from Swartz Synopsis Filicum *pl. 1. fig. 4.*
3. *Loxogramme lanceolata* (Sw.) Presl, from *Rosenstock 9*, Kilimandjaro.
4. *Loxogramme africana* Copel. Type.
5. *Loxogramme Fauriei* Copel. Type.

PLATE II

FIG. 6. *Loxogramme Brooksii* Copel. Type.
7. *Loxogramme parallela* Copel. Type.
8. *Loxogramme linearis* Copel. Type.
9. *Loxogramme blumeana* Presl, from *Raciborski*, Tjibodas.
10. *Loxogramme involuta* (Bl.) Presl, from *Copeland 1558*, Zamboanga.

PLATE III

FIG. 11. *Loxogramme grandis* (Racib.) Copel. Cotype.
12. *Loxogramme Forbesii* Copel. Type.
13. *Loxogramme iridifolia* (Christ) Copel., from *Copeland 1629*, Zamboanga.

PLATE IV

FIG. 14. *Loxogramme dimorpha* Copel. Type.
15. *Loxogramme paltonioides* Copel. Type.
16. *Loxogramme conferta* Copel. Type.
17. *Loxogramme Salvinii* (Hook.) Maxon, from *Maxon & Hay 3262*, Guatemala.

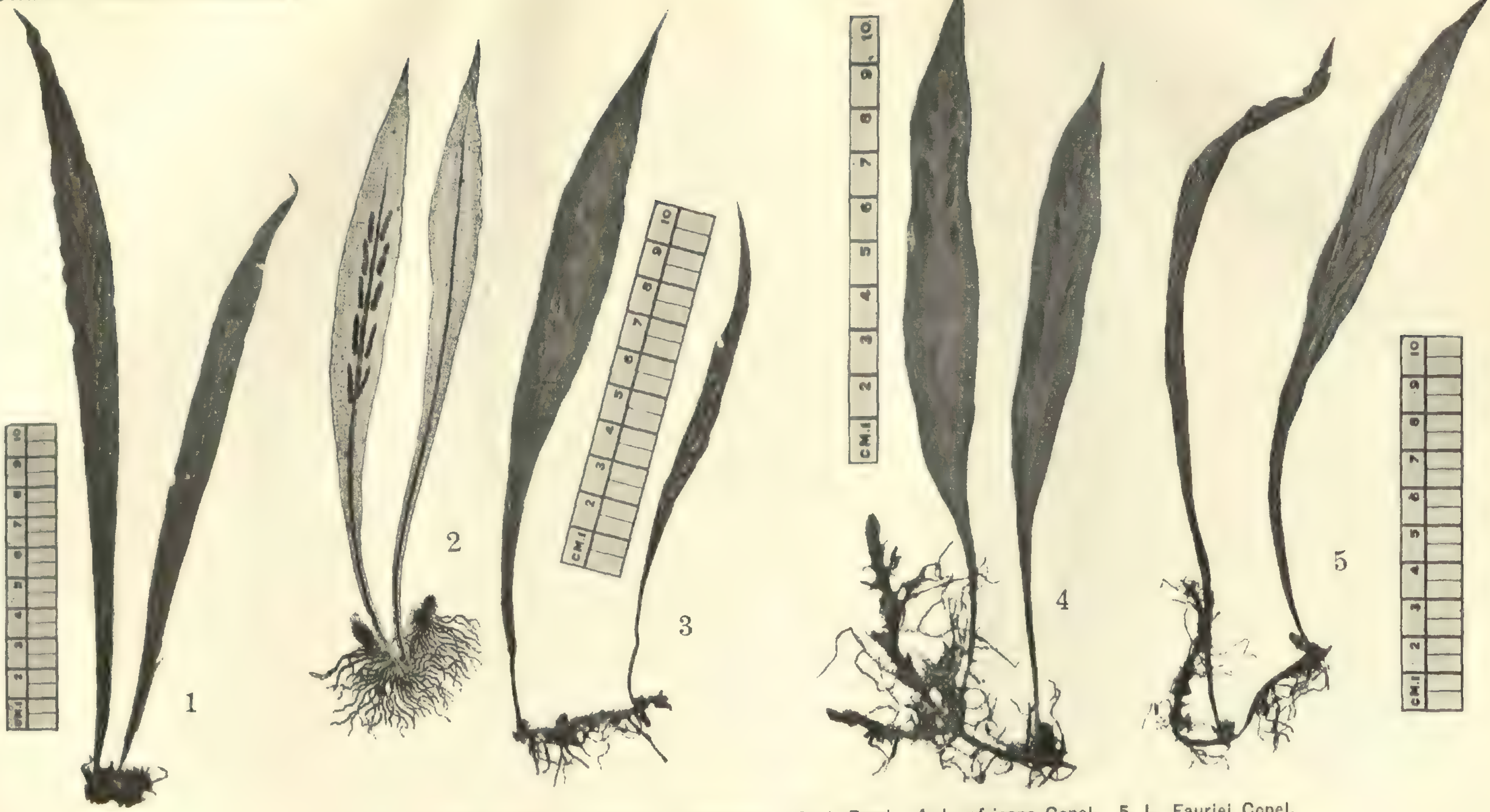

Fig. 1. Loxogramme malayana Copel. 2 and 3. L. lanceolata (Sw.) Presl. 4. L. africana Copel. 5. L. Fauriei Copel.

PLATE I.

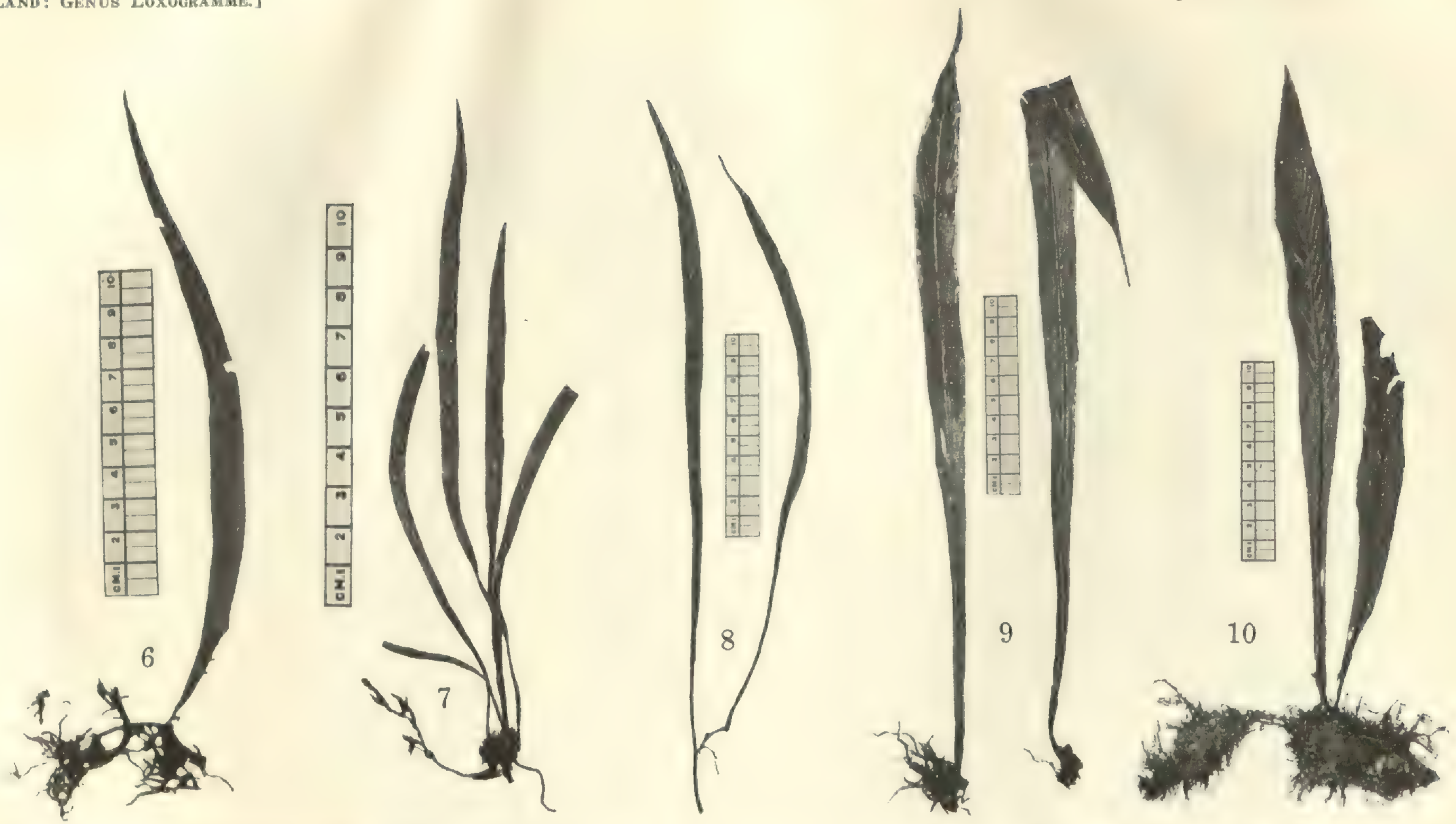

Fig. 6. Loxogramme Brooksii Copel. 7. L. parallela Copel. 8. L. linearis Copel. 9. L. Blumeana Presl. 10. L. involuta (Bl.) Presl.

PLATE II.

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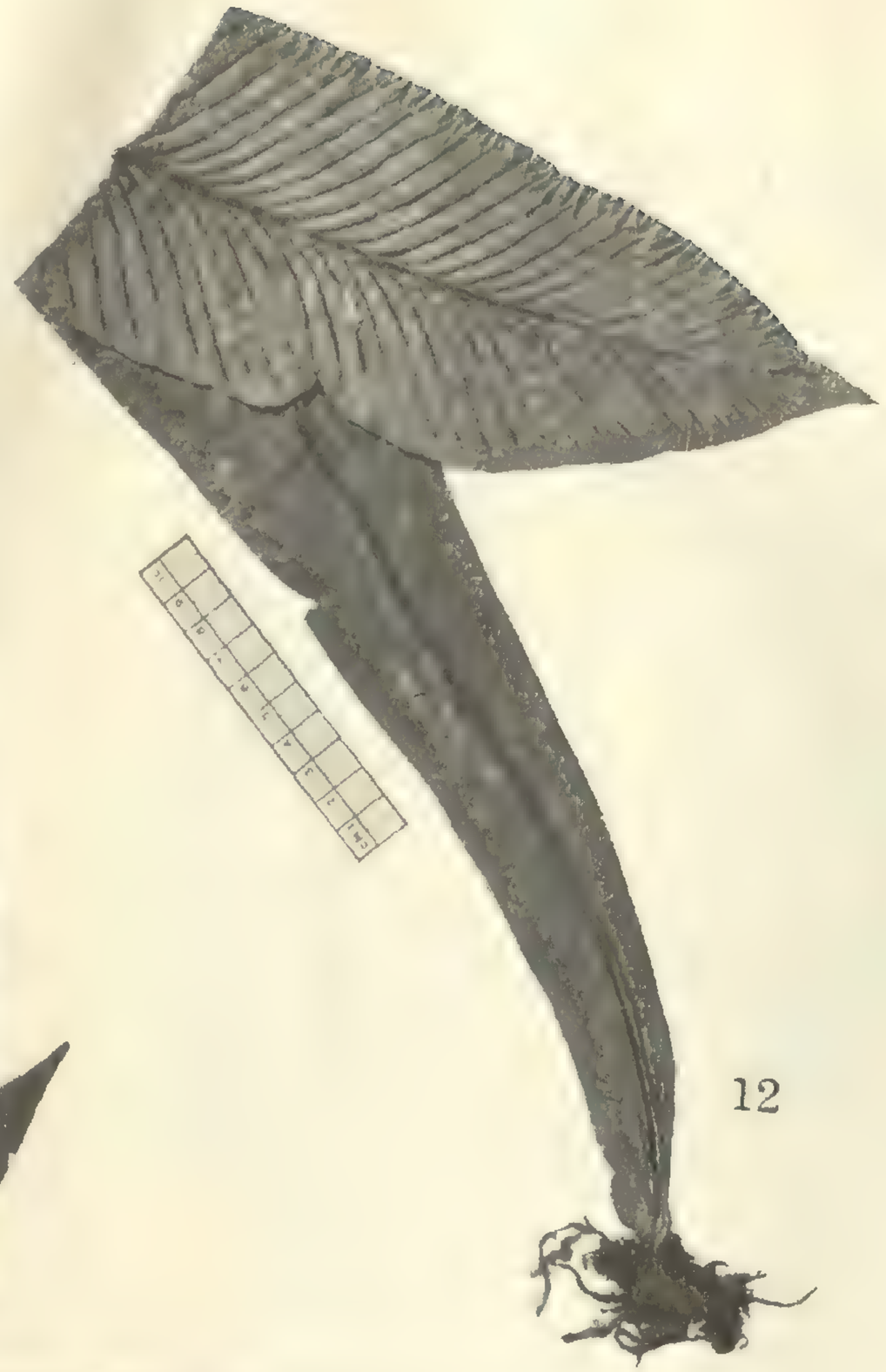

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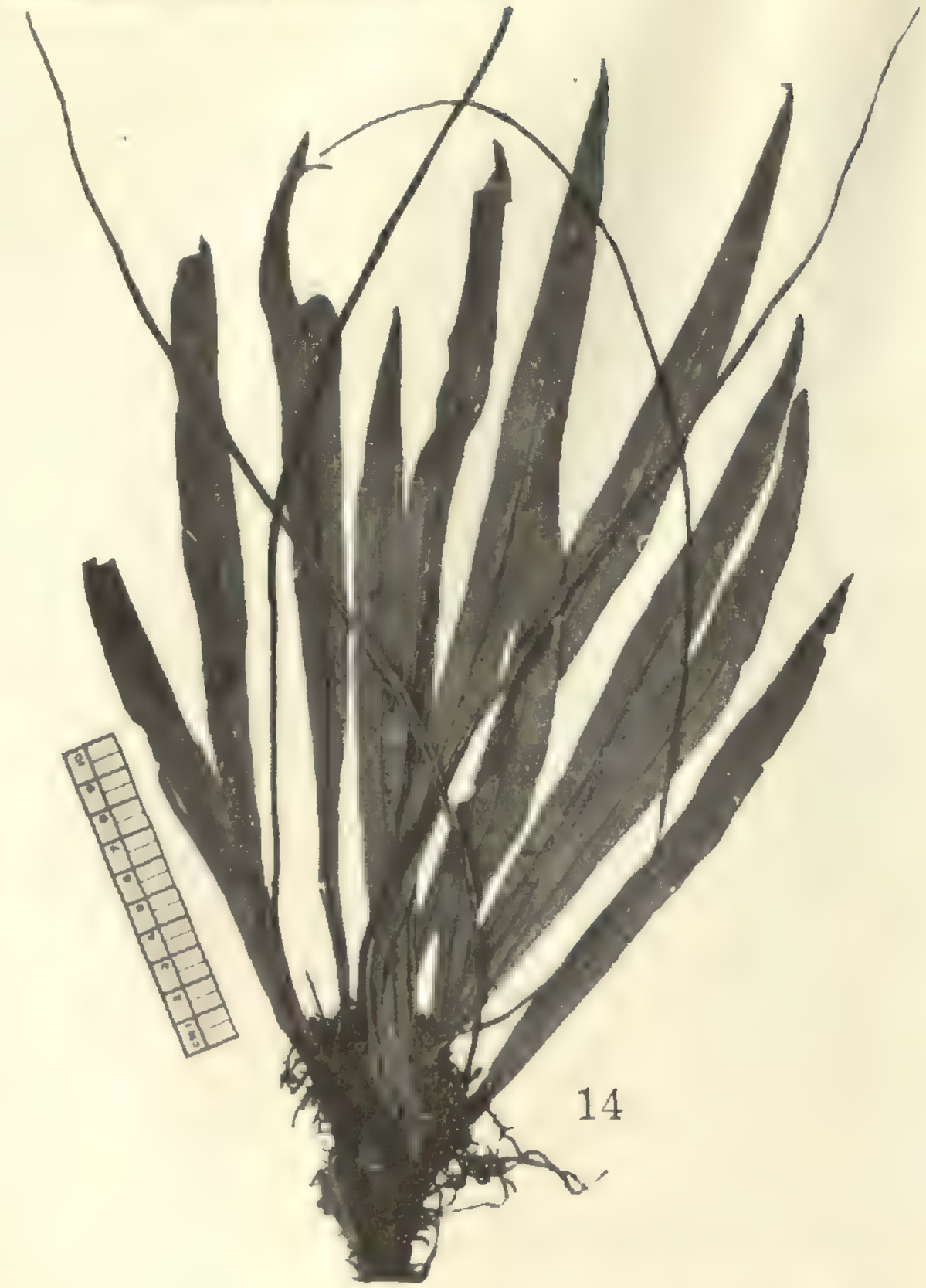
Fig. 11. Loxogramme grandis (Racib.) Copel. 12. L. Forbesii Copel. 13. L. iridifolia (Christ) Copel.

PLATE III.



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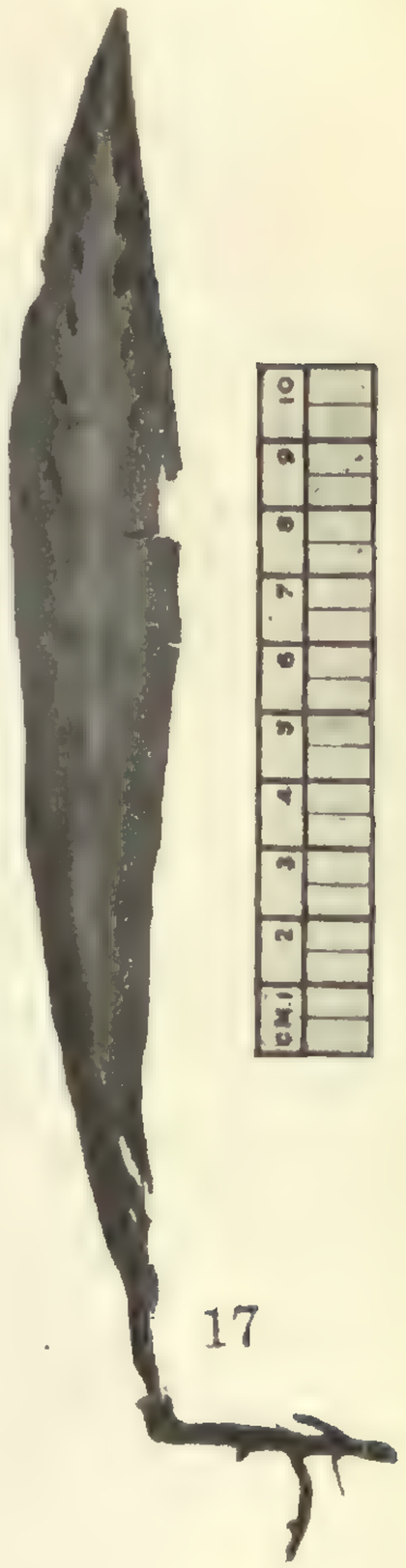

17

Fig. 14. Loxogramme dimorpha Copel. 15. L. paltonioides Copel. 16. L. conferta Copel. 17. L. Salvinii (Hook.) Maxon.

PLATE IV.

THE PHILIPPINE
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NOTES ON THE FLORA OF BORNEO

By E. D. MERRILL[1]
(*From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.*)

The flora of the great Island of Borneo is very imperfectly known, and for this reason it has been quite impossible to work out in detail the phytogeographic relationships between the Philippines and Borneo. From the geographic proximity of the islands, definite phytogeographic relationships are to be expected, yet so far as publications go, and so far as collections already made have been studied, the cases of special distribution of species between the Philippines and Borneo are strikingly weak when compared with those between the Philippines and the islands to the south and southeast of the Archipelago.

With the object of determining more in detail just what the relationships of the Philippine and Bornean floras are, an attempt has been made, in the past five or six years, to secure Bornean botanical material for purposes of study and comparison with that originating in the Philippines. Through the kindness of Mr. J. C. Moulton, director of the Sarawak Museum, Kuching, Sarawak, a native collector was secured, who worked intermittently for the Bureau of Science for several years under Mr. Moulton's direction, the specimens thus collected being transmitted to the Bureau of Science from time to time. Additional collections were made in Sarawak by Dr. F. W. Foxworthy in 1908 for the Bureau of Science. Important collections were also received in exchange, notably a nearly complete set of Charles Hose's Sarawak collections from the British Museum,

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some material from Dr. Hubert Winkler from Dutch Borneo, miscellaneous Bornean material from the Botanic Garden at Buitenzorg, Java, and from the collections of Mr. H. N. Ridley, formerly director of the Botanic Garden at Singapore. Recently there has been received a small but interesting lot of botanical material, chiefly representing the commercial timber trees of British North Borneo, collected by Mr. A. Villamil in the service of the Forestry Department of British North Borneo, and finally very extensive collections from Mount Kinabalu, British North Borneo, made by Chaplain and Mrs. Clemens and Mr. D. Le Roy Topping, October to December, 1915. This Kinabalu collection is probably by far the largest that has ever been taken from that mountain by any single expedition, but the material, only recently received, has not been available in the preparation of this paper.

It has been known for some years that there is a remarkable phytogeographic relationship between the Philippines and the islands to the south and southeast. Without taking into consideration cases of special and limited specific distribution, it is only necessary to enumerate some of the striking genera that are known only from the indicated regions. Some of these are *Sararanga*, *Microlaena*, *Ascarina*, *Phrygilanthus*, *Spiraeopsis*, *Clianthus*, *Wallaceodendron*, *Reinwardtiodendron*, *Strophioblachia*, *Koordersiodendron*, *Oncocarpus*, *Pleiogynium*, *Cubilia*, *Tristira*, *Ganophyllum*, *Euphorianthus*, *Pimelea*, *Schuurmansia*, *Eucalyptus*, *Osbornia*, *Xanthostemon*, *Gyrinopsis*, *Anompanax*, *Lepiniopsis*, and *Dolicholobium*. On the other hand, only four genera are known from Borneo and the Philippines and confined to them, and two of these hardly extend into the Philippines proper. These are *Philbornea*, Borneo-Palawan; *Eusideroxylon*, Borneo-Sulu Archipelago; *Clemensia;* and *Hallieracantha*. The list of species known only from Borneo and the Philippines is equally poor when compared with the list known from the Philippines and Celebes, or the Philippines and the Moluccas as a group. In the year 1909 but about thirty species of the limited distribution Philippines-Borneo were known [2] and but a single genus, *Hallieracantha*. Some of the species have since been found in other regions, so that this list has now been somewhat reduced. Additions, however, increase the total, such as *Dinochloa ciliata* Kurz, *Albizzia scandens* Merr., *Dalbergia subaltrni-*

[2] Merrill, E. D. The Malayan, Australian, and Polynesian elements in the Philippine Flora. Ann. Jard. Bot. Buitenz. Suppl 3 (1909) 287.

folia Merr., *Erythrophloeum densiflorum* Merr., and *Omphalea malayana* Merr., reported in this paper, *Gardenia merrillii* Elm., *Artocarpus superba* Becc., *Clemensia*, the recently collected Bornean plant perhaps representing a distinct species, and a few others. Of special interest is the recent discovery on Mount Kinabalu, by Mrs. Clemens, of the very peculiar *Blechnum* (*Lomaria*) *fraseri* Luerss., previously known only from the higher mountains of the Philippines and from New Zealand.

As was to be expected, a study of the Bornean collections has materially increased our knowledge of cases of special distribution between the Philippines and Borneo, yet a preliminary examination of all the material so far received from Borneo does not indicate that the floristic relationships between Borneo and the Philippines are any where nearly as marked as between the Philippines and the Moluccas. It seems to be very probable, moreover, that on the whole the flora of the Moluccas is about as little known as is that of Borneo.

In the present paper one new genus, *Moultonianthus*, and forty-eight new species, in the families *Cyperaceae, Euphorbiaceae, Flacourtiaceae,* and *Leguminosae,* are described. A number of other species are definitely recorded from Borneo for the first time, while the genera *Sphaerocaryum, Omphalea, Trigonopleura, Erythrophloeum, Pahudia,* and *Osmelia* are new to the island. In the course of the study I have been able to reduce the Philippine genus described by me a few years ago as *Alcinaeanthus* to the Malayan genus *Scortechinia* of Hooker f.

GRAMINEAE

DINOCHLOA Büse

DINOCHLOA CILIATA Kurz in Journ. As. Soc. Beng. 42[2] (1873) 253, in nota; Camus Bamb. (1913) 170, *t. 95, f. D.*

Dinochloa scandens O. Ktze. var. *angustifolia* Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 392; Gamble l. c. 5 (1910) Bot. 279, 8 (1913) Bot. 206.

Dinochloa tjankorreh Büse var. *angustifolia* Hack. ex Merr. l. c. in syn.

SARAWAK, *Native collector 1719, 2427* (Bur. Sci.).

Dinochloa ciliata Kurz was based on *Cuming 687* from Laguna Province, Luzon, although the specimen is not cited by Kurz, or by Camus. Munro[3] referred it to *Dinochloa tjankorreh* Büse, as representing the typical form of that species. Kurz[4] merely mentions it in a note following his

[3] Trans. Linn. Soc. 26 (1870) 153.
[4] Journ. As. Soc. Beng. 42[2] (1873) 253.

description of *Dinochloa andamanica* thus: "Specimina ex insulis Philippinis, valvula interiore ciliata gaudentia et a cl. Munro cum *D. Tjangkorreh* conjuncta mihi est species nova et etsi eam non vidi *D. ciliatam* nomino;" Camus adds a figure of it. The Bornean specimens, while not quite identical with Philippine material, differ less from the type specimens of *D. ciliata* Kurz and *D. scandens* var. *angustifolia* Merr., than does other Philippine material placed here. The last two are unquestionably identical. The only other species of the genus known from Borneo is typical *Dinochloa scandens* O. Kuntze, represented by *Hose 65.*

PANICUM Linnaeus

PANICUM BARBINODE Trin. in Mém. Acad. Pétersb. VI 3 [2] (1835) 256.

SANDAKAN, *Drs. F. & C. Baker*, January, 1915.

This species, apparently purposely introduced for forage purposes, has not previously been reported from Borneo. It is very frequently confused with *Panicum molle* Sw. Commonly known as Pará grass.

PANICUM PERAKENSE (Hook f.) comb. nov.

Panicum humidorum Ham. var. *perakense* Hook f. Fl. Brit. Ind. 7 (1897) 54; Ridl. Mat. Fl. Malay. Penins. (Monocot.) 3 (1907) 137.

In describing this form originally Hooker states "Probably a different species," i. e., distinct from *P. humidorum* Ham. This I am convinced is the case, and accordingly I have rased the variety *perakense* to specific rank. I have specimens from Perak, *Ridley 14386;* from Johor, *Ridley 11007;* and the Bornean specimen cited below.

SARAWAK, Mount Sudan, *Native collector 2048* (Bur. Sci.). The species is new to Borneo.

PANICUM MALABARICUM (Linn.) Merr. in Philip. Journ. Sci. 4 (1910) Bot. 248.

Poa malabarica Linn. Sp. Pl. (1753) 69.
Panicum arnottianum Nees in Steud. Syn. Pl. Gram. (1854) 59.

BORNEO, Tambusan, *Ridley 12328;* Mount Sudan, *Native collector 2047* (Bur. Sci.), the latter with prominently ciliate sheaths.

This species has been sunk in *Panicum nodosum* Kunth by some authors, but I consider it specifically distinct. For discussion see Merrill in Philip. Journ. Sci. 4 (1910) Bot. 248.

SPHAEROCARYUM Nees

SPHAEROCARYUM PULCHELLUM (Roth) comb. nov.

Isachne pulchella Roth Nov. Sp. (1821) 58.
Panicum pulchellum Spreng. Syst. 1 (1825) 322.
Panicum malaccense Trin. Gram. Pan. (1826) 204.
Sphaerocaryum elegans Nees ex Steud. Nomencl. ed. 2, 2 (1841) 620.

BORNEO, Kuching, *Ridley 11341.*

The species is new to Borneo. India and Ceylon to the Malay Peninsula, Singapore, and southern China.

CYPERACEAE

FIMBRISTYLIS Vahl

FIMBRISTYLIS DURA (Zoll. & Mor.) comb. nov.

Isolepsis dura Zoll & Mor. Syst. Verzeich. (1845–46) 97; Miq. Fl. Ind. Bat. 3 (1857) 312.

Fimbristylis asperrima Boeckl. in Linnaea 37 (1871–73) 40; Clarke in Hook. f. Fl. Brit. Ind. 7 (1893) 643.

SARAWAK, Lundu, *Foxworthy 325*, May 31, 1908; near Kuching, *Native collector 670* (Bur. Sci.), August, 1911.

The species has been reported from Borneo by Ridley, by Winkler, and by Miss Gibbs, as *Fimbristylis asperrima* Boeckl. *Isolepsis dura* is, however, the older name. Ceylon to the Malay Peninsula and Archipelago.

MAPANIA Aublet

MAPANIA FOXWORTHYI sp. nov. § *Halostema.*

Foliis coriaceis, usque ad 120 cm longis et 2 cm latis, basi haud angustatis, apice longissime sensim attenuatis, margine aculeato-scabris; capitulis longe pedunculatis, globosis, sub anthesin circiter 4 cm diametro, spicis circiter 25, distinctis, oblongo-ovoideis, 1.7 ad 2 cm longis, bracteis 1 ad 1.5 cm longis.

A coarse perennial glabrous plant. Leaves numerous, linear, coriaceous, somewhat shining, up to 120 cm long, 1.5 to 2 cm wide, base scarcely narrowed, sheathing but not widened or inflated, the upper portion gradually narrowed into a slender, aculeate-scabrid tail 15 to 20 cm in length, the margins rather prominently aculeate-scabrid, the midrib aculeate-scabrid on the lower surface in the upper part of the leaf. Scapes about 40 cm long, obscurely 3-angled. Heads, in flower, globose, about 4 cm in diameter, composed of about 20 distinct spikes, the individual spikes brown when dry, oblong-ovoid, 1.7 to 2 cm long, each composed of very many spikelets. Bracts ovate, brown, coriaceous, 1 to 1.5 cm long, those subtending the spikes 2 or 3, boat-shaped, keeled, about 8 mm long. Bracteoles about 12 mm long, 3 mm wide, oblong, coriaceous, striate, glabrous, obtuse. Two outer glumes linear, boat-shaped, scabrid on the keel, 10 to 12 mm long, the others linear, thin, about as long as the outer two. Styles bifid, rarely trifid.

SARAWAK, Mount Poë (Rumput), *Foxworthy 392*, June 3, 1908, near the summit of the mountain.

A species well characterized by its long narrow leaves which are very gradually narrowed upward to the long, slender, aculeate-scabrid tip but not narrowed toward the base; its long scapes; and its large globose solitary heads in which the individual spikes, about 25 in number, are distinct. It probably is as closely allied to *Mapania palustris* Benth. as to any other species, but is entirely distinct from that form.

MAPANIA PLATYPHYLLA sp. nov. § *Pandanophyllum.*

Foliis petiolatis, petiolo 15 ad 20 cm longo, laminis usque ad 40 cm longis et 8 cm latis, apice longe abrupte caudatis; scapis 10 ad 12 cm longis, monocephalis, capitulis anguste oblongis, 1.5 ad 2 cm longis.

Rhizome stout, the upper part covered with the much-broadened, somewhat inflated basal portions of the petioles. Leaf-blades oblong, chartaceous, up to 40 cm long and 8 cm wide, 3-nerved, gradually narrowed below into the rather stout petiole, which is 10 to 14 mm wide when spread, the basal portion rather abruptly enlarged, somewhat inflated, sheathing, when spread 4 to 5 cm in width, the apex rather abruptly narrowed into the slender, scabrid, 10 cm long, caudate appendage. Scapes 10 to 12 cm long, solitary or several in an axil, subtended by several overlapping bracts. Heads solitary, of a single oblong spike 1.5 to 2 cm in length. Bracts coriaceous, glabrous, about 8 mm long, the bracteoles similar but smaller. Outer two glumes somewhat ciliate on the keels.

SARAWAK, *Native collector 993* (Bur. Sci.), 1912.

Manifestly allied to the Bornean *Mapania petiolata* C. B. Clarke, but with leaf-blades twice as wide and half as long as in that species and shorter scapes.

EUPHORBIACEAE

ANTIDESMA Burmann

Few species of this rather large genus have been credited to Borneo, yet it is evident from the material at hand that the genus is largely developed in the island. Species previously credited to Borneo are *Antidesma auritum* Tul., *A. ghesaembilla* Gaertn., *A. gibbsiae* Hutchins., *A montanum* Bl., *A. moritzii* Muell.-Arg., *A. neurocarpum* Miq., *A. stipulare* Bl., *A. tomentosum* Bl., and *A. venenosum* J. J. Sm., of which two are endemic. In our Bornean material three additional forms are represented by material insufficient for description, neither of which can I refer to any described species. *Antidesma cuspidatum* Muell.-Arg. is here credited to Borneo for the first time, while nine species are proposed as new, making the total number of species known from Borneo at least twenty-two.

ANTIDESMA CUSPIDATUM Muell.-Arg. in Linnaea 34 (1865) 67; DC. Prodr. 15² (1866) 252.

SARAWAK, *Native collector 266, 504, 507, 508* (Bur. Sci.); *Hewitt s. n.* Localities given on the labels are Santubong, Tabuan, Matang, and Rock Road.

The specimens are all with staminate flowers, but agree closely with the description of the above species and with a full series of specimens from Singapore, eight sheets, mostly collected by Ridley, and mostly erroneously named *Antidesma moritzii* Muell.-Arg. The Sarawak specimens have somewhat larger leaves than the Singapore ones, up to 20 cm long and 9 cm wide, but in all essentials seem to be identical with the

Singapore plant. The species is very readily distinguishable by its relatively long petioles, on the Bornean specimens the petioles varying from 1 to 2 cm. in length. The species is new to Borneo.

ANTIDESMA VENENOSUM J. J. Sm. in Ic. Bogor. 4 (1910) 41, *t. 313*.

This endemic species is represented by *Hose 317*, from Long Tarkun, Baram, November, 1894; by *Native collector 2814* (Bur. Sci.) from Selungo, Upper Baram, November, 1914; and by *Winkler 2513*, from Hayoep, south-eastern Borneo.

ANTIDESMA FOXWORTHYII sp. nov.

Frutex 1 ad 2 m altus, partibus junioribus inflorescentiisque plus minusve rubiginoso-pubescentibus; foliis coriaceis in siccitate brunneis vel olivaceis, oblongis ad anguste oblongo-obovatis, usque ad 20 cm longis, basi acutis vel obtusis, apice prominente acuminatis, nervis utrinque circiter 7, adscendentibus, prominentibus; racemis ♀ axillaribus, solitariis, usque ad 12 cm longis; floribus 5-meris, breviter pedicellatis; fructibus 1 cm longis, valde inaequilateralibus, brunneis, leviter rugosis, carinatis, plus minusve inflatis, stylis terminalibus.

A shrub 1 to 2 m high, the young branchlets, leaves on the costa and nerves beneath, and the inflorescence more or less rubiginous-pubescent, the fully mature leaves becoming glabrous or nearly so. Branches slender, terete, pale-gray. Leaves oblong to narrowly oblong-obovate, coriaceous, brown or olivaceous when dry, somewhat shining, 12 to 20 cm long, 4 to 7 cm wide, narrowed below to the acute or obtuse base, the apex rather prominently acuminate, the acumen 1 to 1.5 cm long, blunt or somewhat apiculate; lateral nerves about 8 on each side of the midrib, prominent, ascending; petioles stout, pubescent, 2 to 3 mm long; stipules oblong-ovate to lanceolate, brown, obtuse to acuminate, 10 to 12 mm long, sometimes in unequal pairs. Pistillate racemes axillary, solitary, 10 to 12 mm long, the rachis rubiginous-pubescent. Fruits about 1 cm long, their pedicels stout, 1 mm long, the subtending bracteoles narrowly ovate, acuminate, pubescent, as long as the pedicels. Persistent calyx 3 mm in diameter, slightly pubescent, the lobes 5, triangular, acute, extending less than one-third to the base of the calyx. Fruits dark-brown when dry, glabrous, strongly inequilateral, one side nearly straight, the other strongly curved, somewhat inflated, keeled, somewhat rugose when dry, base rounded, apex apiculate, about 1 cm long; stigma small, terminal.

SARAWAK, Mount Poë, *Foxworthy 268* (type), *246*, May 25 and 26, 1908, the former from thickets at the edge of clearings, the latter from an altitude of 1,000 meters.

This species strongly resembles and is manifestly closely allied to *Antidesma cumingii* Muell.-Arg. of the Philippines, but is readily distinguished by a number of characters, notably by its much fewer-nerved leaves. From the glabrous fruit it is assumed that the ovary is also glabrous, while in *Antidesma cumingii* the ovary is densely pubescent.

ANTIDESMA GRANDISTIPULUM sp. nov.

Frutex vel arbor parva, glabra, vel ramulis junioribus leviter puberulis; foliis lanceolatis vel anguste oblongo-lanceolatis, usque ad 35 cm longis, longe acuminatis, basi acutis, nitidis, nervis utrinque 15 ad 17, prominentibus, anastomosantibus; stipulis sessilibus, inaequilateralibus, usque ad 4 cm longis, acutis vel acuminatis, persistentibus, junioribus chartaceis, vetustioribus subcoriaceis, nitidis; inflorescentiis ♀ racemosis, axillaribus, solitariis, usque ad 35 cm longis, glabris, floribus 5-meris, pedicellatis; fructibus 1.3 ad 1.5 cm longis, compressis, leviter inaequilateralibus, in siccitate brunneis, nitidis, reticulatis, stylis terminalibus.

A glabrous shrub or small tree, or the young branchlets slightly puberulent. Branches and branchlets terete, pale, slender. Leaves lanceolate to narrowly oblong-lanceolate, 20 to 35 cm long, 4 to 6.5 cm wide, firmly chartaceous to subcoriaceous, brown and shining when dry, apex rather long and slenderly acuminate, base acute; lateral nerves 15 to 17 on each side of the midrib, prominent, anastomosing into a distinct, arched, submarginal nerve, the reticulations distinct; petioles stout, 5 to 10 mm long; stipules large, prominent, persistent, chartaceous to subcoraceous, brown, shining, in texture and color similar to the leaves, somewhat inequilateral, narrowed toward the base and to the acute to acuminate apex, the larger ones up to 4 cm long and 2 cm wide, those on the younger branchlets smaller, sometimes only 1.5 cm long and about 1 cm wide. Pistillate racemes axillary, solitary, in fruit up to 35 cm in length, glabrous, the fruiting pedicels 2 to 3 mm long, the persistent calyx with five short teeth. Fruits oblong-ovate, somewhat inequilateral, brown, glabrous, and shining when dry, reticulate, compressed, 1.3 to 1.5 cm long, the stigma terminal.

SARAWAK, *Native collector 1148* (Bur. Sci.) (type), and a specimen, without number, from the Sarawak Museum, marked Kuching, November, 1905.

A very characteristic species, readily distinguishable by its long, narrow, slenderly acuminate leaves; its large persistent stipules; its very long, simple, pistillate racemes; and its large fruits. It is apparently closely allied to *Antidesma pachystachys* Hook. f. of the Malay Peninsula.

ANTIDESMA SARAWAKENSE sp. nov.

Species praecedente affinis, differt nervis lateralibus magis numerosis, 20 ad 22 utrinque, stipulis late ovatis vel subrhomboideis, obtusis, basi truncatis ad subcordatis, 1.5 ad 3 cm longis, racemis ♀ brevioribus, circiter 20 cm longis, pedicellis paullo longioribus.

A glabrous shrub or small tree, the branches slender, terete. Leaves oblong-lanceolate, 20 to 28 cm long, 4 to 7 cm wide, brown and shining when dry, paler beneath, apex rather prominently acuminate, apiculate, base acute; lateral nerves 20 to 22 on each side of the midrib, prominent, anastomosing and forming an arched intramarginal vein, the reticulations distinct; petioles about 1 cm long; stipules coriaceous, brown, shining, persistent, broadly ovate to subrhomboid, obtuse to rounded, base truncate to subcordate, 1.5 to 3 cm long, 1.2 to 2.5 cm wide. Fruiting racemes axillary, solitary, about 20 cm long. Fruits similar to those of *Antidesma grandistipulum*, their pedicels 5 to 7 mm long.

SARAWAK, Rock Road, *Native collector 503* (Bur. Sci.), July 27.

Manifestly very closely allied to the preceding, but with more numerously nerved leaves, quite differently shaped stipules, shorter pistillate racemes, and longer pedicels. A full series of specimens may present intergrading forms, and thus ultimately lead to the reduction of the present species. Judging from the material available, however, it is sufficiently distinct.

ANTIDESMA HALLIERI sp. nov.

Frutex vel arbor subtus foliis ad costa nervisque ramulis junioribus stipulisque plus minusve rubiginoso-pubescentibus; foliis chartaceis, oblongis ad oblongo-lanceolatis, usque ad 18 cm longis, prominente caudato-acuminatis, basi acutis, nervis utrinque circiter 9; stipulis lanceolatis ad ovato-lanceolatis, tenuiter acuminatis, 1 ad 2 cm longis; racemis ♀ axillaribus, solitariis, usque ad 12 cm longis, floribus 5-meris, paucis, pedicellis sub fructu circiter 1 cm longis; fructibus subobovoideis, haud compress, rotundatis, stigmate sublateralibus.

A shrub or tree, the young branchlets, petioles, stipules, and lower surface of the leaves on the midrib and lateral nerves more or less rubiginous-pubescent, some parts densely so. Branches slender, terete, glabrous, pale-grayish when dry. Leaves chartaceous, oblong to oblong-lanceolate, 12 to 18 cm long, 3.5 to 4.5 cm wide, base acute, apex slenderly caudate-acuminate, the acumen usually about 2 cm long, the upper surface olivaceous, glabrous, the lower brown and prominently rubiginous-pubescent along the midrib and lateral nerves; nerves about 9 on each

side of the midrib, prominent, anastomosing; petioles 2 to 4 mm long; stipules lanceolate to ovate-lanceolate, slenderly acuminate, slightly inaequilateral, 1 to 2 cm long, 3 to 7 mm wide, more or less rubiginous-pubescent. Racemes axillary, solitary, the pistillate ones up to 12 cm long, somewhat pubescent, the flowers rather few, scattered, the pedicels in fruit about 1 cm long, spreading. Calyx pubescent, 5-parted, the lobes extending about one-half to the base. Fruit glabrous, not compressed, subobovoid, about 5 mm long, the stigma sublateral.

BORNEO, without definite locality, *Hallier 1773*.

A species well characterized by its rubiginous indumentum, but more especially by its scattered, long-pedicelled, obovoid, smooth fruits which are scarcely compressed, but sometimes roughly triangular in cross-section, and their sublateral stigmas. It is not closely allied to any species known to me.

ANTIDESMA PACHYPHYLLUM sp. nov.

Arbor, ramulis junioribus inflorescentiis ferrugineo-pubescentibus exceptis glabra; foliis crasse coriaceis, oblongis, usque ad 17 cm longis, prominente acuminatis, basi subacutis ad rotundatis, nitidis, in siccitate supra olivaceis, subtus brunneis, nervis utrinque circiter 8, distinctis; stipulis lanceolatis, circiter 4 mm longis, caducis; inflorescentiis ♀ brevibus, parce ramosis, ramis circiter 1 cm longis; floribus confertis, sessilibus, 4-meris, calycis ultra medium divisis; fructibus breviter pedicellatis, leviter compressis, circiter 6 mm longis, stylis terminalibus.

A tree, glabrous except the very young branchlets, stipules, and inflorescences, which are ferruginous-pubescent. Branches terete, pale-grayish. Leaves oblong, rather thickly coriaceous, dark-olivaceous on the upper surface, brown on the lower, and prominently shining on both when dry, 8 to 17 cm long, 4 to 6.5 cm wide, apex prominently and usually acutely acuminate or the acumen apiculate, base subacute to rounded; lateral nerves about 8 on each side of the midrib, slender, distinct, anastomosing; petioles about 1 cm long; stipules lanceolate, acuminate, pubescent, about 4 mm long, caducous. Pistillate inflorescences axillary, solitary, in anthesis about 1 cm long, densely ferruginous-pubescent, the branches, from or near the base, usually 2 or 3, sometimes one or none, cylindric. Flowers sessile, densely arranged. Bracteoles pubescent, broadly ovate, rounded, less than 1 mm long. Calyx-segments 4, oblong-ovate, pubescent, 0.8 mm long, extending about two-thirds to the base of the calyx. Ovary ovoid, glabrous, about 1.5 mm long; stigma terminal. Fruit ovoid, slightly inequilateral, about 6 mm long, somewhat com-

pressed, red, wrinkled when dry, on somewhat thickened, glabrous, 1 mm long pedicels, the branches of the inflorescence in fruit 1 to 3 cm in length.

SARAWAK, Baram District, Miri River, *Hose 69* (type) with pistillate flowers, January, 1895; Baram, *Hose 139*, January, 1895, in fruit; Lundu, *Foxworthy 32*, May 10, 1908, in fruit; without definite locality, *Native collector 1431, 1589* (Bur. Sci.), the latter with staminate flowers.

The last number cited, with staminate flowers, is referred here tentatively, and probably represents the same species. The inflorescences resemble those of the pistillate plants, but the branches are more slender and up to 3 cm in length. The flowers are sessile, 4-merous, and the calyx-segments extend more than half way to the base. The species is well characterized by its thickly coriaceous, strongly shining, prominently acuminate leaves; the few, short, cylindric, densely flowered branches of the pistillate inflorescence; and its sessile flowers; the fruits, however, on short, thickened, glabrous pedicels.

ANTIDESMA PHANEROPHLEBIUM sp. nov.

Arbor, ramulis inflorescentiisque griseo-pubescentibus exceptis glabra vel subglabra; foliis oblongis, subcoriaceis, usque ad 23 cm longis, brunneis vel olivaceis, nitidis, abrupte subcaudato-acuminatis, basi acutis ad subrotundatis, nervis utrinque circiter 12, supra impressis, subtus valde prominentibus; inflorescentiis ♀ terminalibus vel subterminalibus, usque ad 15 cm longis, ramis 2 vel 3, valde elongatis; floribus breviter pedicellatis, calycis truncatis, 1.5 mm diametro, margin minute denticulatis, extus pubescentibus; fructibus ovoideo-ellipsoideis, glabris, 6 mm longis, utrinque angustatis, acutis, aequilateralibus, in siccitate rugosis, leviter carinatis, haud compressis.

A tree, the branchlets and inflorescence grayish or cinereous-pubescent with short hairs, the older branches terete, glabrous. Leaves oblong, subcoriaceous, 12 to 23 cm long, 5 to 10 cm wide, when very young somewhat pubescent on the midrib and lateral nerves on both surfaces, at full maturity quite glabrous or with a few hairs persisting along the midrib beneath, when dry somewhat shining, olivaceous or somewhat brownish, the apex abruptly subcaudate-acuminate, the acumen 1 to 1.5 cm long, acute or somewhat apiculate, the base acute to somewhat rounded; lateral nerves about 12 on each side of the midrib, impressed on the upper surface, very prominent on the lower surface, looped-anastomosing near the margins, the reticulations distinct; petioles 3 to 5 mm long, somewhat pubescent; stipules lanceolate, acute or acuminate, puberulent, about 5 mm long. Pistillate inflorescences terminal or subterminal, pubescent, up to 15 cm in length, each composed of two or three elongated branches, the flowers rather numerous, racemosely disposed.

Pedicels pubescent, stout, about 1 mm long, the bracteoles oblong-lanceolate, acuminate, pubescent, about 1.2 mm long. Calyx cup-shaped, pubescent, 1.5 mm in diameter, truncate, or with three or four very broad, very obscure lobes, or these not at all evident, the margins minutely denticulate. Ovary ovoid, glabrous, including the rather prominent, terminal stigmas about 2 mm long. Fruit ovoid-ellipsoid, 6 mm long, narrowed at both ends, acute, equilateral, glabrous, wrinkled, not compressed but obscurely keeled.

SARAWAK, without definite locality, *Native collector 1384* (Bur. Sci.) (type); Lundu, *Foxworthy 37*, May 10, 1908, known to the Dyaks as *camaiit*.

This species somewhat resembles specimens of *Antidesma moritzii* Muell.-Arg., but is not closely allied to it. It is well characterized by its truncate, minutely denticulate calyces, which are not at all or but very obscurely and shallowly 3- or 4-lobed; the few elongated branches of its terminal inflorescence; and its very prominently nerved leaves.

ANTIDESMA RIVULARE sp. nov.

Arbor 7 ad 8 m alta ramulis subtus foliis ad costa nervisque petiolis stipulis inflorescentiisque plus minusve villosis; foliis coriaceis vel subcoriaceis, in siccitate brunneis, nitidis, usque ad 20 cm longis, oblongis ad late oblongo-oblanceolatis, prominente acuminatis apiculatisque, basi leviter inaequilateralibus, plus minusve angustatis, rotundatis ad subacutis, nervis utrinque circiter 12, adscendentibus, supra impressis subtus valde prominentibus, stipulis lanceolatis, acuminatis, circiter 1 cm longis; racemis ♀ axillaribus, solitariis, usque ad 18 cm longis; floribus pedicellatis, 4-meris; fructibus anguste ovoideis, reticulatis, compressis, basi leviter inflatis, brunneis, nitidis, parce pubescentibus, circiter 8 mm longis, stylis terminalibus.

A tree 7 to 8 m high. Branches grayish, terete, glabrous, the branchlets rather densely villous with brownish-gray hairs. Leaves oblong to broadly oblong-oblanceolate, 11 to 20 cm long, 3 to 7 cm wide, brown and shining on both surfaces when dry, prominently and rather slenderly acuminate, the acumen apiculate, base somewhat narrowed, somewhat inequilateral, rounded or sometimes subacute, the upper surface glabrous, the lower pubescent on the midrib and lateral nerves; nerves about 12 on each side of the midrib, impressed on the upper surface, very prominent on the lower surface, ascending, anastomosing; petioles densely pubescent, 2 to 4 mm long; stipules narrowly lanceolate, acuminate, pubescent, about 1 cm long. Pistillate racemes solitary, axillary, in fruit up to 18 cm long; the rachis, pedicels, calyx, and bracteoles pubescent. Fruits rather scattered, reddish

when fresh, brown and shining when dry, reticulate, with few, short, scattered hairs, somewhat inequilateral, compressed, base somewhat inflated, rounded, about 8 mm long and 5.5 mm wide; stigmas terminal.

SARAWAK, Sungei Tingei, *Foxworthy 471*, June 25, 1908, at the edge of a tidal stream (type); Retuh, Sadong, *Native collector 2535* (Bur. Sci.), February–June, 1914, from débris attached apparently from the banks of streams subject to inundation in times of flood.

This species belongs in the group with *Antidesma tomentosum* Blume, and is well characterized by its narrow, somewhat inequilateral leaves, the nerves impressed on the upper surface, very prominent on the lower surface, rather strongly ascending, and its pubescent branchlets, petioles, inflorescences, stipules, midrib, and nerves on the lower surface of the leaves. The fruits are very sparingly pubescent and much smaller than in Blume's species.

ANTIDESMA RUBIGINOSUM sp. nov.

Frutex vel arbor parva, partibus junioribus stipulis subtus foliis ramulis inflorescentiisque dense rubiginoso-pubescentibus; foliis oblongis ad oblongo-lanceolatis, usque ad 15 cm longis, tenuiter acuminatis, basi acutis, nervis utrinque 6 vel 7, prominentibus, curvato-adscendentibus; stipulis lanceolatis, tenuiter acuminatis, circiter 1 cm longis; inflorescentiis ♀ racemosis, rariter depauperato-paniculatis, racemis pedunculatis, 2 ad 3 cm longis; floribus 4-meris, confertis, breviter pedicellatis, disco glabro, cupuliforme, truncato, prominente; ovario glabro, stylis terminalibus.

A shrub or small tree, prominently rubiginous-pubescent with rather soft, short hairs. Branches slender, terete, pale-gray, glabrous, the young branchlets densely rubiginous-pubescent as are the petioles, inflorescences, and the midrib and nerves on the lower surface of the leaves. Leaves oblong to oblong-lanceolate, firmly chartaceous to subcoriaceous, 9 to 15 cm long, 2.5 to 4 cm wide, narrowed below to the acute base and above to the slenderly acuminate apex, the acumen tipped by a long and slender apiculus, the upper surface dark-colored when dry, glabrous, the lower dark-brown, prominently rubiginous-pubescent on the midrib and nerves and with fewer hairs scattered over the surface; lateral nerves 6 or 7 on each side of the midrib, curved-ascending, prominent, anastomosing; petioles about 2 mm long; stipules narrowly lanceolate, slenderly acuminate, rubiginous-pubescent, often somewhat inequilateral or slightly falcate, about 1 cm long and 2 to 3 mm wide. Pistillate racemes spikelike, axillary, solitary, the upper ones sometimes with a single branch, densely rubiginous-pubescent, peduncled, 2 to 3 cm long, the upper part densely flowered. Pedicels stout, pubes-

cent, 1 to 1.5 mm long, about twice as long as the subtending bracteoles. Calyx pubescent, the lobes four, 0.5 mm long, extending about one-half to the base. Disk very prominent, cup-shaped, truncate, glabrous. Ovary ovoid, glabrous, the stigmas terminal.

SARAWAK, Baram District, Baram, *Hose 297*, October 10, 1894.

A species well characterized by its prominent, rubiginous indumentum; its short-petioled, slenderly acuminate leaves; its simple, axillary, spikelike, peduncled racemes; and the prominent, cup-shaped, truncate, glabrous disk of its pistillate flowers.

ANTIDESMA STENOPHYLLUM sp. nov.

Frutex vel arbor, glabra; foliis lanceolatis ad anguste lanceolatis, usque ad 17 cm longis et 3.5 cm latis, utrinque subaequaliter angustatis, basi acutis, apice longe acuminatis, coriaceis, nitidis, nervis utrinque circiter 10; stipulis anguste lanceolatis, acuminatis, circiter 7 mm longis; spicis ♂ axillaribus, solitariis, tenuibus, usque ad 5 cm longis; floribus 4- vel 5-meris, calycis laciniis brevibus, rotundatis.

An entirely glabrous shrub or small tree, the branches terete, grayish or brownish. Leaves narrowly lanceolate, coriaceous, olivaceous, shining, 11 to 17 cm long, 2 to 3.5 cm wide, subequally narrowed to the acute base and to the long and slenderly acuminate apex; lateral nerves about 10 on each side of the midrib, slender, curved-ascending; petioles stout, up to 5 mm in length; stipules lanceolate, coriaceous, acuminate, about 7 mm long. Male spikes slender, solitary, axillary, up to 5 cm in length. Flowers 4- and 5-merous, sessile, the bracteoles small, rounded. Calyx about 1.5 mm in diameter, shallowly 4- or 5-lobed, the lobes rounded, much shorter than the tube. Pistillate flowers and fruits unknown.

SARAWAK, Mount Sudan, *Native collector 2081* (Bur. Sci.) February-June, 1914.

A very characteristic species, distinguishable at once by its very long and narrow, slenderly acuminate, narrowly lanceolate, coriaceous leaves.

ANTIDESMA TOMENTOSUM Blume Bijdr. (1826) 1126; J. J. Sm. in Koord. & Valet. Bijdr. Boomsoort. Java 12 (1910) 264.

SARAWAK, Baram District, Entoyut River, *Hose 382*, December, 1894.

The specimen is with pistillate flowers, and agrees perfectly with Smith's extended description. The species has already been reported from Borneo by Smith, as well as from Java, the Batoe Islands, and Celebes; and, by the reduction of *Antidesma kingii* Hook f., to Perak.

APOROSA Blume

APOROSA EUPHLEBIA sp. nov.

Frutex vel arbor, inflorescentiis exceptis glaber; foliis anguste oblongis, usque ad 25 cm longis, utrinque nitidis, concoloribus,

integris, margine revolutis, subcoriaceis, breviter obtuse acuminatis retusisque, basi obtusis vel subacutis, nervis utrinque circiter 12, supra leviter impressis, subtus cum reticulis valde prominentibus; stipulis inaequimagnis, coriaceis, orbiculari-reniformibus, rotundatis, 1 ad 2 cm diametro; spicis ♂ e axillis defoliatis, ferrugineo-pubescentibus, usque ad 2.5 cm longis, sepalis 4, 0.5 mm longis, staminibus 2, rariter 3.

A shrub or tree, quite glabrous except the ferruginous-pubescent inflorescence. Branches terete, grayish, smooth. Leaves narrowly oblong, subcoriaceous, pale brownish olivaceous, of the same color on both surfaces and rather strongly shining when dry, apex abruptly and shortly broad-acuminate, the acumen retuse, base obtuse to subacute, margins entire, revolute; lateral nerves about 12 on each side of the midrib, somewhat impressed on the upper surface, very prominent on the lower surface, as are the lax primary reticulations, curved, arched-anastomosing; petioles thickened at the apex, 1.5 to 2 cm long; stipules orbicular or orbicular-reniform, equilateral, rounded, coarsely reticulate, in texture, color, etc., similar to the leaves, rounded, margins revolute, base cordate, clasping the branchlets, 1 to 2 cm in diameter, those of each pair unequal in size, one about one-half as large as the other. Male spikes in the axils of fallen leaves, fascicled, few in each fascicle, up to 2.5 cm in length. Flowers about 1 mm in diameter, the sepals 4, about 0.5 mm long, elliptic-obovate or elliptic, rounded, very sligthly pubescent; stamens 2, rarely 3.

SARAWAK, Upper Baram, Selungo, *Native collector 2823* (Bur. Sci.), November 26, 1914 (original number 75).

A species manifestly belonging in the same group as *Aporosa lunata* Kurz, but with entirely glabrous leaves and branchlets, and entirely different stipules, which are orbicular to orbicular-reniform, rounded, cordate, equilateral, not at all falcate, pointed, or semicordate as in Kurz's species.

APOROSA HOSEI sp. nov.

Frutex vel arbor partibus junioribus inflorescentiisque exceptis glabra; foliis oblongis, integris, coriaceis, acuminatis, basi rotundatis ad obtusis interdum obscure subcordatis, usque ad 20 cm longis, glabris, nervis utrinque 8 ad 10, curvato-adscendentibus, subtus prominentibus; stipulis lunatis, falcatis, acuminatis, circiter 1 cm longis; inflorescentiis ♂ fulvo-tomentosis, 2 ad 3 cm longis, floribus 5-meris, pedicellatis, ovario subglabro; floribus ♂ sessilibus, sepalis 3, obtusis, staminibus 2, longe exsertis.

A shrub or tree, glabrous except the very young tips of the branchlets and the inflorescences, which are fulvous-pubescent

or tomentose. Branches and branchlets terete, brownish to grayish. Leaves oblong, coriaceous, rather pale or pale-brownish-olivaceous when dry, entire, somewhat shining, quite glabrous on both surfaces or the very young ones slightly fulvous-pubescent on the midrib and nerves beneath, 10 to 20 cm long, 3 to 6.5 cm wide, the apex rather prominently acuminate, base obtuse to rounded, sometimes very obscurely cordate; lateral nerves 8 to 10 on each side of the midrib, not impressed on the upper surface, very prominent on the lower surface, curved-ascending, anastomosing, the primary reticulations fine, distinct, subparallel; petioles stout, about 5 mm long, when young fulvous-pubescent, soon becoming quite glabrous; stipules foliaceous, coriaceous, similar in texture and appearance to the leaves, lunate, strongly falcate, acuminate, about 1 cm long and 4 mm wide, when young very slightly pubescent, becoming glabrous. Male spikes short, cylindric, dense, 1 to 2 cm long, axillary and in the axils of fallen leaves, one or two to several in each axil, somewhat pubescent. Sepals 3, obovate to narrowly obovate, rounded, obtuse, slightly pubescent, about 1 mm long. Stamens 2, their filaments long-exserted, about 2.5 mm long. Female inflorescences racemose, 1 to 3 cm long, densely fulvous-tomentose, solitary or several from each axil, peduncled, or at least without flowers in the lower part, the pedicels stout, fulvous-pubescent, about 1 mm long. Calyx fulvous-tomentose, the sepals 5, oblong-ovate, acuminate, about 1 mm long. Ovary and styles black when dry, glabrous, or the ovary with very few, scattered, fulvous hairs, about 2 mm long, ellipsoid; styles 3, stout, spreading, nearly 3 mm long, cleft to about the middle into two stout arms.

SARAWAK, Baram District, Baram, *Hose 40, 92* (type), *278*, March, 1895, and October, 1894; near Kuching, 5th mile, Rock Road, *Native collector 558* (Bur. Sci.), July 27, 1911.

A species manifestly closely allied to *Aporosa lunata* Kurz, from which it differs, however, in many characters, notably in its glabrous branches and leaves, and much fewer nerves which are not impressed on the upper surface. From *Aporosa benthamiana* Hook. f., to which it is apparently even more closely allied, it differs notably in its much smaller, fewer-nerved leaves.

APOROSA SUBCAUDATA sp. nov.

Frutex vel arbor subtus foliis ramulis inflorescentiisque dense ferrugineo-pubescentibus; foliis subcoriaceis, oblongis, integris, usque ad 20 cm longis, apice prominente subcaudato-acuminatis, basi acutis, nervis utrinque 9 ad 11, subtus valde prominentibus; spicis ♂ numerosis, 1 ad 2 cm longis, fasciculatis, axillaribus et e axillis defoliatis; sepalis 4, leviter pubescentibus; filamentis 2.

A shrub or tree, the young branches, the inflorescences, and the lower surface of the leaves rather densely ferruginous-pubescent. Older branches glabrous, reddish-brown, terete. Leaves subcoriaceous, oblong, 16 to 20 cm long, 5 to 6 cm wide, entire, base narrowed, acute, apex rather abruptly subcaudate-acuminate, the acumen slender, at least 1.5 cm long, the upper surface pale-greenish when dry, entirely glabrous, somewhat shining, the nerves very slightly impressed, the lower surface uniformly ferruginous- or brownish-pubescent, the indumentum dense on the midrib and lateral nerves, the hairs scattered on the reticulations; lateral nerves 9 to 11 on each side of the midrib, very prominent, curved-ascending, anastomosing, the primary reticulations prominent, subparallel; petioles 8 to 10 mm long, pubescent, ultimately glabrous; stipules deciduous, not seen. Pistillate spikes very numerous, 1 to 2 cm long, ferruginous-pubescent, densely many-flowered, 5 to 10 or more in each fascicle, the fascicles axillary and in the axils of fallen leaves. Sepals 4, somewhat pubescent, oblong, acute to obtuse, about 0.7 mm long. Stamens 2. Pistillate flowers unknown.

SARAWAK, Baram District, Baram, *Hose 204*, April, 1895.

A species well characterized by its indumentum, its numerous, crowded, fascicled staminate spikes, and its prominently subcaudate-acuminate leaves which are acute at the base, entirely glabrous on the upper surface and prominently pubescent beneath.

APOROSA NIGRICANS Hook. f. Fl. Brit. Ind. 5 (1887) 347.

SARAWAK, Matang Road, *Native collector 1155* (Bur. Sci.), May 15, 1911.

The species is new to Borneo. The specimen is with pistillate flowers, agrees well with Hooker's description, and matches Singapore specimens, *coll. Ridley*, fairly closely. The leaves are less acuminate than in the Singapore specimens, and are distinctly pubescent on the lower surface with scatered hairs, especially on the midrib and lateral nerves.

BREYNIA Forster

BREYNIA RACEMOSA (Blume) Muell.-Arg. in DC. Prodr. 15[2] (1866) 441; J. J. Sm. in Koord. & Valet. Bijdr. Boomsoort. Java 12 (1910) 177.

Melanthesia racemosa Blume Bijdr. (1825) 177.
Phyllanthus reclinatus Roxb. Fl. Ind. 3 (1832) 669.
Breynia reclinata Hook. f. Fl. Brit. Ind. 5 (1887) 331.

SARAWAK, near Kuching, *Native collector 559* (Bur. Sci.); Dutch Borneo, *Hallier 1345*.

The species has not previously been reported from Borneo. The Bornean and Malay Peninsula plant is unquestionably the same as the Javan species originally described by Blume and of which J. J. Smith has recently given a very complete and detailed description. In addition to the Bornean specimens, I have before me three specimens from Java, Singapore, *Ridley s. n.*, distributed as *Breynia coronata*, and Pahang,

Burn Murdoch 206, Ridley 5043. As Hooker f. has pointed out Mueller referred to *Breynia racemosa* representatives of at least three species, but the form described by Hooker under the name *Breynia reclinata* is unquestionably the same as Blume's original *Melanthesia racemosa*. The latter specific name, being the older, is here retained.

COELODEPAS Hasskarl

COELODEPAS HOSEI sp. nov.

Frutex vel arbor inflorescentiis exceptis glaber; foliis oblongis, firme chartaceis vel subcoriaceis, usque ad 20 cm longis, acuminatis, basi acutis, obscure stipellari-biglandulosis, margine distanter denticulatis, nervis utrinque 7, prominentibus; inflorescentiis ♀ axillaribus, solitariis, racemosis, 2 ad 4 cm longis, leviter adpresse-pubescentibus, ovario pubescente, stylis brevibus, fimbriato-ramosissimis.

A shrub or tree, quite glabrous except the inflorescence. Branchlets pale-olivaceous, terete or somewhat compressed, lenticellate. Leaves oblong, firmly chartaceous to subcoriaceous, pale-olivaceous when dry, 12 to 20 cm long, 4 to 7 cm wide, apex rather abruptly and prominently acuminate, base acute, with a small stipellate gland on each side at the juncture with the petiole, margins in the upper one-half distantly denticulate, below entire; lateral nerves 7 on each side of the midrib, prominent, curved-ascending, anastomosing, the reticulations distinct, lax; petioles 1 to 3 cm long. Pistillate racemes axillary, solitary, 1 to 4 cm long, appressed-pubescent with short, pale hairs. Pedicels about 1 mm long, pubescent. Calyx-segments triangular, acute, about 0.5 mm long, pubescent. Ovary ovoid, pubescent, pale, 3-celled, cells 1-ovuled; styles about 2 mm long, spreading, divided into numerous slender fimbriae.

SARAWAK, Baram District, Entoyut River, *Hose 465*, November 13, 1894.

Apparently closely allied to *Coelodepas wallichiana* Benth., from which it is readily distinguished by its much smaller, longer-petioled leaves, which are acute at the base, denticulate above, and its racemose not spicate inflorescences.

CROTON Linnaeus

CROTON ENSIFOLIUS sp. nov. § *Eucroton*.

Frutex vel arbor parva, foliis junioribus inflorescentiisque exceptis glaber; foliis numerosis, linearis, usque ad 7 cm longis et 7 mm latis, coriaceis, junioribus parcissime stellato-lepidotis, margine distanter crenulatis; racemis 3 ad 6 cm longis, floribus inferioribus ♀, superioribus ♂; floribus ♀ sepalis 5, circiter 2 mm longis, ovario stellato-pubescentibus; ♂ petalis linearioblongis, margine dense albido-ciliatis; filamentis 10.

A shrub or small tree, nearly glabrous, the branches slender, terete, brownish, the younger ones somewhat striate. Leaves furfuraceous-lepidote, numerous, crowded, linear, 4 to 7 cm long, 4 to 7 mm wide, coriaceous, subequally narrowed to the cuneate base and rather blunt apex, the margins distantly crenulate, pale-greenish, rather dull when dry, entirely glabrous, the very young ones with few, scattered, pale, stellate scales, the basal glands rather prominent; lateral nerves about 6 on each side of the midrib, very obscure; petioles up to 3 mm in length. Racemes 3 to 6 cm long, sparingly stellate-furfuraceous or stellate-lepidote. Female flowers: Pedicels 1 to 1.5 mm long; sepals 5, oblong-ovate to ovate-lanceolate, acuminate, 2 to 2.5 mm long; petals none; ovary ovoid, pale stellate-pubescent, about 1.5 mm long, 3-celled; style arms spreading, 1.5 mm long. Male flowers above on the same inflorescence, more numerous than the female, about 4 mm in diameter, their pedicels 1.5 mm long. Sepals oblong-ovate, acute. Petals linear-oblong, flat, 1.6 mm long, margins prominently white-ciliate or lanate. Stamens 10; filaments about 2 mm long.

SARAWAK, Baram District, Lio-matu, *Native collector 2770* (Bur. Sci.) (original number 21), October 30, 1914.

A very strongly marked species, readily recognized by its very narrow, linear, distantly crenulate, coriaceous leaves, which at maturity are entirely glabrous, but when young with few, scattered, stellate-lepidote scales. I know of no species to which it is closely allied. It probably belongs in the group with *Croton heterocarpus* Muell.-Arg.

GLOCHIDION Forster

GLOCHIDION PEDUNCULATUM sp. nov. § *Euglochidion.*

Arbor (vel frutex) floribus ♂ exceptis glabra; foliis ovatis ad oblongo-ovatis, firme chartaceis, nitidis, usque ad 8 cm longis, acuminatis, breviter acute apiculatis, aequilateralibus, nervis utrinque 6 vel 7, tenuibus; floribus 6-meris, perianthii segmentis interioribus quam exterioribus paullo minoribus, glabris, ♂ pedicellatis, antheris 5, coalitis; ♀ in capitulis breviter pedunculatis dispositis, pedicellatis, ovario dense vestito, 5-loculare, columnis stylaribus cylindraceis, dense pubescentibus, quam ovario multo longioribus.

A glabrous shrub or small tree, the branches and branchlets reddish-brown, slender, the latter slightly compressed or angled. Leaves distichous, ovate to oblong-ovate, 5 to 8 cm long, 2.5 to 3.8 cm wide, somewhat brownish-olivaceous when dry, smooth, shining, the lower surface paler than the upper, equilateral, the base acute to rounded, apex somewhat acuminate and minutely

and sharply apiculate; lateral nerves 6 or 7 on each side of the midrib, slender, distinct, curved-anastomosing; petioles about 4 mm long. Flowers axillary, all 6-merous, the upper ones mostly pistillate, the lower mostly staminate, sometimes both found in the same axil. Male flowers pedicellate, about 4.5 mm in diameter, the pedicels slender, 4 to 5 mm long. Outer three perianth segments ovate, recurved, about 3 mm long, the inner three similar, but considerably narrower, rather coriaceous. Anthers 5, united into a globose mass about 1 mm in diameter. Pistillate flowers numerous, crowded in definite peduncled heads, the peduncles 3 to 4 mm long, flowers 3 or 4 to 10 in a head, their pedicels 1 to 2 mm long, each head subtended by numerous, oblong, acuminate, 1 mm long bracts. Perianth segments 6, oblong-ovate, about 2.5 mm long, the inner three somewhat narrower than the outer ones. Ovary very densely pubescent, 5-celled, the column densely pubescent, stout, cylindric, not constricted at the base, slightly narrower than the ovary, densely pubescent, the stigmatic portions usually 5, glabrous, the column about four times as long as the ovary.

SARAWAK, *Native collector 150* (Bur. Sci.).

A very characteristic species, easily recognized by its peduncled heads of pistillate flowers, its 6-merous flowers, densely pubescent ovary and style, the latter cylindric, stout, about four times as long as the ovary. In aspect it somewhat resembles the Philippine *Glochidion trichogynum* Muell.-Arg., but is not closely allied to that species, and belongs in an entirely different section of the genus.

GLOCHIDION BREYNIOIDES C. B. Rob. in Philip. Journ. Sci. 4 (1909) Bot. 95.

SOUTH-EAST BORNEO, Hayoep, *Winkler 2565*, June 22, 1908.

Luzon, Mindoro, Palawan, Negros, and Leyte; new to Borneo.

GLOCHIDION LEIOSTYLUM Kurz Forest Fl. Brit. Burma 2 (1877) 345; Hook f. Fl., Brit. Ind. 5 (1887) 324.

SARAWAK, Baram District, *Hose 356*, 1894.

This species has been previously reported from Pegu to Tenasserim, the Malay Peninsula, and Singapore. The Bornean specimen cited above presents only male flowers, and agrees closely with Singapore specimens collected by Ridley.

GLOCHIDION KOLLMANNIANUM (Muell.-Arg.) J. J. Sm. in Koord. & Valet. Bijdr. Boomsoort. Java. 12 (1910) 166.

Phyllanthus kollmannianus Muell.-Arg. in Flora 23 (1865) 378.

SARAWAK, *Native collector 179* (Bur. Sci.).

The specimen is identical in all respects with the Celebes plant collected at Baleh Anjen by Teysmann, mentioned by J. J. S. Smith, l. c. 168, as probably representing an abnormal form of *Glochidion kollmannianum*. The inflorescences on both are somewhat cymose, although some

fascicles occur. The specimens appear to be different from Javan material supposed to represent the same species, but the differences may be due mostly, if not entirely, to the abnormal inflorescences, probably caused by insects.

MACARANGA Thouars

MACARANGA INSIGNIS sp. nov. § *Caladiifoliae.*

Arbor parva, glabra, ramulis teretibus, crassis, laevis, pruinosis, cavis; foliis longe petiolatis, glabris, usque ad 40 cm longis, basi late peltatis, 7- vel 9-nerviis, late rotundatis vel truncatis, profunde palmatim 5-lobatis, lobis oblongis ad oblongo-lanceolatis, caudato-acuminatis, integris; inflorescentiis ♂ axillaribus, pedunculatis, subcapitatis, bracteis magnis pruinosis persistentibus suffultis, floribus dense confertis, staminibus 5 vel 6; floribus ♀ dense confertis, ovario cupreo- vel ferrugineo-furfuraceo; capsulis 5-locularis, extus laevis.

A small glabrous tree, the branchlets cylindric, smooth, pruinose, 6 to 10 mm in diameter, hollow, perforated, and inhabited by ants. Leaves coriaceous, glabrous, broadly ovate in outline, very deeply palmately 5-lobed, up to 40 cm in length, shining, peltate; base very broadly rounded or truncate, sometimes slightly undulate, sometimes with a very few minute teeth, the basal lobes spreading or slightly falcate, 8 to 11 cm long, much shorter than the three central lobes, the petiole inserted 6 to 7 cm from the margin; upper three lobes oblong to oblong-lanceolate, 5 to 10 cm wide, caudate-acuminate, entire or distantly and minutely denticulate, the sinuses extending to within 3 to 7 cm of the insertion of the petiole; nerves 7 or 9, palmate, very prominent; petioles pruinose, 25 to 40 cm long. Male inflorescences axillary, solitary, their pruinose peduncles up to 7 cm in length, the inflorescence dense, subcapitate, 2 to 3 cm in diameter, ovoid; bracts coriaceous, ovate to ovate-lanceolate, concave, curved, acuminate, 1.5 to 2.5 m long, pruinose, persistent. Male flowers very numerous, very densely crowded on the short branches, subtended, and more or less covered, by the bracts. Calyx externally slightly puberulent. Stamens 5 or 6; anthers 3- and 4-celled. Female inflorescence similar to the male, but the bracts apparently not persistent. Flowers crowded. Ovary cupreous- or ferrugineous-furfuraceous, smooth, ovoid, mostly 5-celled. Capsules depressed-globose, pedicelled, when dry about 1 cm in diameter, the valves longitudinally sulcate when dry, not appendaged, glabrous or somewhat furfuraceous.

SARAWAK, *Native collector 169* (type), *171*, *1156*, *1509* (Bur. Sci.).

A remarkable species on account of its leaf characters, its dense inflorescences, and its symbiosis with ants. It is intermediate between the sections *Pachystemon* and *Caladiifoliae*, but on account of its anthers

I have placed it in the latter section, from which it differs in its deeply lobed leaves, more numerous stamens, and its cocci not appendaged. *Macaranga caladiifolia* Becc. is well represented by *167*, *1432*, and *1511* of the same collection.

MOULTONIANTHUS genus novum

(*Euphorbiceae-Cluytieae-Clutiinae*)

Flores monoici, petaligeri, racemosi. Sepala ♂ 5, imbricata, libera. Petala 5, calyce multo longiora. Disci glandulae nullae. Stamina 8 vel 10, 2-verticillata, libera, antherae dithecae, introrsae, longitudinaliter dehiscens, filamenta brevissima. Ovarii rudimentum evolutum. Sepala ♀ 5, imbricata, libera. Petala 5, elongata. Disci glandulae nullae. Ovarium 3-loculare; styli liberi vel basi brevier connati, bifidi; stigmata papillata; ovula in loculis solitaria. Frutex vel arbor parva. Folia alterna, penninervia, breviter petiolata, obscure crenata; stipulis ovatis, profunde cordatis, persistentibus. Racemi axillares, elongati, flores ♂ numerosi, secus rachin fasciculati, ♀ pauci, solitarii, longissime pedicellati.

MOULTONIANTHUS BORNEENSIS sp. nov.

Frutex vel arbor parva inflorescentiis exceptis glabra; foliis oppositis, oblongis ad oblongo-ellipticis, coriaceis, usque ad 25 cm longis, apice late obtuse acuminatis, basi rotundatis, nervis utrinque circiter 10, prominentibus; stipulis 1 ad 4 cm longis, foliaceis; inflorescentiis ♂ racemosis vel depauperato paniculatis, usque ad 12 cm longis, multifloris, floribus tenuiter pedicellatis, fasciculatis; racemis ♀ elongatis, paucifloris, floribus longissime pedicellatis.

A shrub or small tree, glabrous except the inflorescence. Branches terete, slender, smooth, pale- to dark-brown when dry. Leaves opposite, oblong to oblong-elliptic, coriaceous, brown and shining when dry, 12 to 25 cm long, 5 to 9 cm wide, base equilateral, rounded, apex prominently but broadly blunt-acuminate, margins distantly crenulate or dentate-crenulate; lateral nerves about 10 on each side of the midrib, prominent, obscurely anastomosing near the margins, the reticulations obscure; petioles 5 mm long or less; stipules foliaceous, coriaceous, persistent, orbicular to ovate, 1 to 4 cm long, rounded to obtuse, base deeply cordate and clasping the stem. Racemes axillary, solitary, or sometimes one staminate and one pistillate in the same axil, sparingly pubescent. Male racemes many flowered, up to 12 cm long, sometimes developed into a depauperate panicle by short branches in the lower part. Flowers fascicled along the rachis, their pedicels up to 10 mm in length, slender, each fascicle subtended by several ovate, somewhat ciliate, 1 mm long bracteoles.

Sepals 5, ovate to orbicular-ovate, rounded, margins slightly ciliate, free, imbricate, about 2 mm long. Petals 5, free, imbricate, membranaceous, oblong-spatulate, about 5 mm long, 1.7 mm wide, rounded, base gradually narrowed, cuneate. Disk glands none. Stamens 8 or 10, in two verticels, entirely free, all inserted on the disk; anthers ovate, apiculate, introrse, longitudinally dehiscing, about 0.7 mm long, the filaments of the shorter anthers about 0.4 mm long, of the inner about twice as long. Rudimentary ovary present, consisting of three, free, slender, 3 mm long styles. Pistillate racemes slenderer than the staminate ones, up to 15 cm long, with very few, scattered, long-pedicelled flowers, usually not more than five flowers to a raceme, their pedicels up to 4.5 cm in length, somewhat thickened upward. Sepals 5, more or less pubescent, imbricate, free, the outer two reniform-ovate, rounded, about 2 mm long and 3 mm wide, the inner three ovate to oblong-ovate, obtuse, about 4 mm long. Petals 5, free, imbricate, oblong-obovate to oblong-spatulate, rounded, narrowed below to the cuneate base, glabrous, about 10 mm long, 4 to 4.5 mm wide. Disk glands and staminodes none. Ovary densely pubescent, composed of three cocci, 3-celled, cells 1-ovuled; styles stout, spreading or reflexed immediately after anthesis, pubescent, cleft half way to the base, free or very slightly united at the base, the stigmatic surface papillose. Fruits unknown, but apparently 3-celled, and composed of three dry cocci.

SARAWAK, near Kuching, *Native collector 412* (type), *464, 510, 563* (Bur. Sci.). One of the sheets is marked Matang Road, August 12, 1911, and another Rock Road, August 16, 1911.

A very characteristic genus and species, dedicated to J. C. Moulton Esq., director of the Sarawak Museum, through whose interest it was possible for me to secure rich collections of Bornean plants. The genus is probably best placed in the *Clutieae-Clutiinae* near *Trigonostemon* and *Schizostigma*. The only other genus placed here that has its anthers in two verticels is *Trigonopleura*, but *Trigonopleura* and *Moultonianthus* are entirely dissimilar and not closely allied.

The plant is strongly characterized by its opposite, short-petioled, penninerved, eglandular leaves; its prominent, clasping, foliaceous, ovate, cordate, coriaceous, persistent stipules; and its dissimilar staminate and pistillate racemes; besides the peculiar floral characters given above in the diagnosis and description.

OMPHALEA Linnaeus

OMPHALEA MALAYANA sp. nov. § *Penninerviae.*

Frutex scandens, glaber, vel inflorescentiis parcissime pubescentibus, ramis ramulisque teretibus, griseis vel brunneis; foliis anguste oblongis, oblongo-lanceolatis vel oblongo-oblanceolatis,

coriaceis, usque ad 40 cm longis, nitidis, apice breviter obtuse acuminatis, basi acutis ad obtusis, nervis utrinque circiter 15, prominentibus; inflorescentiis vel ramulis floriferis usque ad 40 cm longis, floribus paucis, pedicellatis, fasciculatis, ramulis floriferis sursum foliis juvenilibus instructis.

A scandent glabrous shrub or the younger parts of the inflorescence obscurely pubescent. Branches and branchlets terete, grayish or brownish, usually wrinkled when dry. Leaves coriaceous, shining, narrowly oblong to oblong-lanceolate or oblong-oblanceolate, 20 to 40 cm long, 4.5 to 7 cm wide, the apex blunt-acuminate, the acumen usually about 1 cm long, the base usually acute, rarely obtuse, and with a pair of prominent glands on the upper surface at the juncture of the petiole with the blade; lateral nerves about 15 on each side of the midrib, prominent, somewhat curved, anastomosing, the reticulations lax; petioles 1.5 to 4 cm long, stout. Inflorescences axillary, up to 40 cm in length, somewhat paniculate, the branches few, greatly elongated, and with rather numerous, thin, membranaceous, juvenile leaves toward their tips. Female flowers in scattered fascicles along the branches, their pedicels 6 to 10 mm long. Sepals 5, oblong, obtuse, glabrous, 2.5 to 3 mm long.

BORNEO, Sarawak, Baram, *Hose 44* (type), March, 1895; without definite locality, *Native collector 405* (Bur. Sci.). PHILIPPINES, Luzon, Province of Camarines, *For. Bur. 21116 Valderrama*, April 6, 1914: Province of Isabela, Palanan Bay, *Bur. Sci. 21130 Escritor*, June 25, 1913.

This species is closely allied to *Omphalea philippinensis* Merr., otherwise the only species of the genus known from the Indo-Malayan region, differing distinctly and consistently in its larger, fewer-nerved leaves. I can see no valid reason for considering the Philippine and Bornean specimens, cited above, other than the same species; the former were originally determined by me as *Omphalea philippinensis* Merr., to which species they manifestly cannot be referred.

OSTODES Blume

OSTODES FAUCIFLORUS sp. nov.

Frutex vel arbor, ramulis junioribus inflorescentiisque parce adpresse pubescentibus exceptis glaber; foliis firme chartaceis, oblongis, oblongo-ellipticis, vel oblongo-obovatis, usque ad 18 cm longis, brevissime petiolatis, acuminatis, basi acutis ad subrotundatis, vix stipellari-biglandulosis, margine distanter glanduloso-crenulatis, nervis utrinque 8 ad 13; inflorescentiis ♂ axillaribus, solitariis, brevissimis, racemosis, floribus paucis, longe pedicellatis; petalis obovatis, 5 ad 6 mm longis; staminibus circiter 12, filamentis latis, exterioribus liberis, 3 interioribus alte connatis.

A shrub or tree, glabrous except the sparingly appressed-

pubescent young branchlets and rachis of the short racemes. Branches slender, terete, gray or reddish-brown. Leaves alternate, firmly chartaceous, subolivaceous, shining, oblong, oblong-elliptic or oblong-obovate, 10 cm long, 4 to 7 cm wide, apex rather prominently acuminate, the acumen blunt, base acute to somewhat rounded, not or very obscurely glandular, the margins distantly glandular-crenulate; lateral nerves 8 to 13 on each side of the midrib, prominent, anastomosing, the reticulations lax, distinct; petioles 2 to 4 mm long; stipules ovate, obtuse, about 4 mm long. Staminate racemes axillary, solitary, very short, few-flowered, the rachis 1 cm long or less, usually but one flower maturing at a time, the bracteoles oblong, about 4 mm long, persistent, the upper inflorescences sometimes reduced to mere fascicles. Pedicels up to 2.5 cm long, thickened upward, slender. Sepals unequal, orbicular-obovate, margins ciliate, about 3 mm in diameter. Petals free, glabrous, obovate, rounded, 5 to 6 mm long. Stamens about 12, the exterior nine free, their filaments broad, flat, about 3 mm long, the interior three stamens with their filaments united for nearly their entire length. Rudimentary ovary none.

SARAWAK, Baram District, Baram, *Hose 244*, March, 1895.

Apparently not closely allied to any of the previously described species, well characterized by its short racemes, its short petioles, its long pedicels, and its broad flat filaments.

OSTODES MACROPHYLLUS (Muell.-Arg.) Benth. in Benth. & Hook. f. Gen. Pl. 3 (1880) 299; Pax in Engl. Pflanzenreich 47 (1911) 18.

Tritaxis macrophylla Muell.-Arg. in Flora 47 (1864) 482.
Ostodes serrato-crenatus Merr. in Philip. Journ. Sci. 4 (1910) Bot. 283.

SARAWAK, Samatan, *Foxworthy 141*, May 19, 1908, known to the Dyaks as *tuchung*.

I consider that Doctor Pax is quite correct in reducing my *Ostodes serrato-crenatus* to *O. macrophyllus*. The known range of the species is now Malacca, Pahang, Borneo, Sibuyan, and the Provinces of Laguna and Cagayan, Luzon.

DIMORPHOCALYX Thwaites

DIMORPHOCALYX (?) BORNEENSIS sp. nov.

Frutex vel arbor, partibus junioribus exceptis glaber; foliis oblongis ad oblongo-ovatis, usque ad 11 cm longis, acute acuminatis basi rotundatis, obscure stipellari-biglandulosis, margin distanter denticulatis, nervis utrinque circiter 12; inflorescentiis ♀ axillaribus, longissime pedunculatis, floribus paucis, pedicellatis, ad apicem depauperato-fasciculatis vel solitariis, pedunculis vetustioribus bracteis foliaceis suffultis; fructibus circiter 12 mm diametro, glabris, laevis, sepalis liberis, leviter accrescentibus.

A shrub or tree, glabrous except the slightly pubescent younger parts. Branches slender, terete, brownish or pale-greenish, glabrous, the young branchlets somewhat appressed ferruginous-pubescent as are the very young petioles. Leaves dark-olivaceous when dry, somewhat shining, glabrous, oblong to ovate-oblong, 7 to 11 cm long, 2.5 to 4.5 cm wide, rather prominently and sharply acuminate, base rounded and usually with two, minute, stipellate glands on the upper surface near the juncture with the petiole, margins distantly and minutely denticulate; lateral nerves slender, about 12 on each side of the midrib; petioles 1 to 3 cm long. Pistellate inflorescences axillary, 10 to 20 cm long, solitary, the flowers few, depauperately fascicled at the apex or solitary, the long peduncle without leaf-like bracts, or with several scattered along the upper one-third, or near the apex, the bracts leaf-like, lanceolate to oblong-elliptic, up to 1.6 mm long, persistent. Pedicels about 5 mm long, in fruit exceeding 1 cm in length. Sepals oblong, obtuse or slightly retuse, about 4 mm long and 1.5 mm wide, in mature fruit about 6 mm long and 2.2 mm wide, free or nearly so, persistent. Petals 5, glabrous, free, broadly spatulate, 5 mm long, 2 mm wide, much narrowed in the lower two-thirds. Disk-glands truncate, nearly square in outline, 0.5 mm long. Ovary ovoid, glabrous, about 1.5 mm long; style very short; divided into three parts, the arms bifid. Mature fruit depressed-globose, dark-colored, smooth and shining, about 12 mm in diameter, composed of three, dry, dehiscent cocci.

SARAWAK, Baram District, Entoyut River, *Hose 420*, November, 1894.

It is with some doubt that I have placed this species in *Dimorphocalyx*, as the staminate flowers are as yet unknown. In aspect it distinctly resembles *Dimorphocalyx longipes* Merr., but is not closely allied to that species. It is readily distinguishable by its few-flowered, very long-peduncled pistillate inflorescence, the flowers borne at the tip of the long peduncle, and the presence of leaf-like bracts scattered along the upper part of the peduncle on most of the inflorescences.

PHYLLANTHUS Linnaeus

PHYLLANTHUS RETICULATUS Poir. in Lam. Encycl. 5 (1804) 298.

SARAWAK, Retuh, Sadong, *Native collector 2544* (Bur. Sci.), February–June, 1914.

Not previously reported from Borneo. Tropical Africa and Asia through Malaya to the Philippines and tropical Australia.

PIMELEODENDRON Hasskarl

PIMELEODENDRON ACUMINATUM sp. nov.

Frutex vel arbor glabra; foliis longe petiolatis, oblongis, firme chartaceis vel subcoriaceis, usque ad 18 cm longis, integris, te-

nuiter acuminatis, basi acutis, eglandulosis, subtus distincte reticulatis, nervis utrinque 4 vel 5; racemis ♂ solitariis, circiter 2 cm longis, pedicellis quam floribus multo longioribus.

A glabrous shrub or tree, the branches slender, terete, reddish-brown. Leaves alternate, firmly chartaceous to subcoriaceous, brown when dry, oblong, entire, 9 to 18 cm long, 3.5 to 6 cm wide, base acute, eglandular, apex rather slenderly acuminate, the acumen 1 to 1.8 cm long, usually blunt; lateral nerves 4 or 5 on each side of the midrib, prominent, anastomosing, the primary reticulations rather lax, slender, distinct on the lower surface; petioles 1 to 6 cm in length, slender. Staminate racemes solitary, rather slender, about 2 cm long, axillary, springing from a small pulvinus; pedicels about 3 mm long, the staminate flowers about 2 mm in diameter, the calyx at least twice as short as the pedicel.

SARAWAK, Baram District, Baram, *Hose 240*, March, 1895.

Manifestly allied to *Pimeleodendron borneense* Warb., from which it is readily distinguishable by its long petioles; solitary, axillary, staminate racemes; and its thinner, fewer-nerved, rather slenderly acuminate leaves, the reticulations distinct on the lower surface. To *Pimeleodendron borneense* Warb. I refer *Hose 206*, *295*, and *Native collector 1048* (Bur. Sci.), all from Sarawak.

SCORTECHINIA Hooker f.

SCORTECHINIA ARBOREA (Elm.) comb. nov.

Alchornea arborea Elm. Leafl. Philip. Bot. 4 (1911) 1274.
Alcinaeanthus arboreus Pax & K. Hoffm. in Engl. Pflanzenrich 63 (1914) 415.
Alcinaeanthus philippinensis Merr. in Philip. Journ. Sci. 7 (1912) Bot. 1274.

The genus *Alcinaeanthus* proposed by me in the year 1912 must now be reduced to the older *Scortechinia* in spite of certain descrepancies between the original descriptions of the two genera. In proposing the genus *Scortechinia* Hooker f. placed it in the tribe *Phyllantheae* with doubt, being uncertain as to the number of ovules in each cell, giving the number doubtfully as two. Pax[5] considered its position doubtful, and placed it among the uncertain or imperfectly described genera at the end of the family. This was overlooked by me in working out the description and status of my genus *Alcinaeanthus*. While the female flowers are as yet unknown, I have been able definitely to determine from the examination of very young fruits that there is but a single ovule in each cell, and am confident that the genus was placed correctly by me in the *Platylobeae-Crotonoideae-Gelonieae*, and very close to the genus *Cheilosa* Blume.

It is to be noted, as already mentioned by Pax, that while in the original and, for that matter, subsequent descriptions of the genus *Scortechinia*, the stamens are described as free, in Hooker's[6] figure of the type

[5] Engl. & Prantl. Nat. Pflanzenfam. 3[5] (1890) 118.

species, *S. kingii*,[6] the filaments are drawn, apparently by error, as united at the base. With this probable error corrected, and the number of ovules indicated as one in each instead of two, there remains no essential difference between *Scortechinia* and *Alcinaeanthus;* and, in fact, the Philippine species seems to be very closely allied to the Malayan ones. The type of the genus, *Scortechinia kingii* Hook. f. is described as having leaves without basal glands, at least the glands are not mentioned in the description nor shown in the figure. In a second species, *S. nicobarica* Hook. f., the basal glands are present.

In addition to the Philippine species mentioned above, the genus presents the following forms:

SCORTECHINIA PARVIFOLIA (Merr.) comb. nov.

Alcinaeanthus parvifolius Merr. in Philip. Journ. Sci. 9 (1914) Bot. 461.

Philippines.

SCORTECHINIA KINGII Hook. f. Ic. Pl. III 8 (1887) *pl. 1706;* Fl. Brit. Ind. 5 (1887) 366.

Perak, Malacca, Borneo.

SCORTECHINIA NICOBARICA Hook. f. Ic. Pl. III 8 (1887) sub *pl. 1706,* nomen; Fl. Brit. Ind. 5 (1887) 367.

SCORTECHINIA FORBESII Hook. f. Ic. Pl. III 8 (1887) sub *pl. 1706,* nomen.

This last species seems never to have been described.
New Guinea.

SEBASTIANA Sprengel

SEBASTIANA CHAMAELA (Linn.) Muell.-Arg. in DC. Prodr. 15' (1866) 1175, var. **ASPEROCCA** (F.-Muell.) Pax & Hoffm. in Engl. Pflanzenreich 52 (1912) 117.

SARAWAK, Santubong, *Native collector 2359* (Bur. Sci.), February–June, 1914.

The species is new to Borneo; India and Ceylon to Kwantung southward to northern Australia, with another variety in tropical Africa. *Cuming 2324,* reported from the Philippines by Pax and K. Hoffmann, was from Malacca, not from the Philippines; the species has not been found in the Philippines.

TRIGONOPLEURA Hooker f.

TRIGONOPLEURA BORNEENSIS sp. nov.

Arbor, ramulis petiolis subtus foliis ad costa nervisque floribusque pubescentibus; foliis oblongis, coriaceis, acuminatis, usque ad 15 cm longis, nervis utrinque circiter 11, prominentibus; floribus ♂ fasciculatis, pedicellatis, sepalis extus dense griseo-puberulis; petalis oblongo-spatulatis, apice rotundatis, basi longe angustatis, 4.5 mm longis, ferrugineo-villosis, columna sursum incrassata.

A tree, the branchlets, petioles, and leaves beneath on the costa

[6] Hook. f. Ic. Pl. III 8 (1887) *pl. 1076, fig. 3.*

and lateral nerves more or less ferruginous-pubescent. Branches terete, brown, eventually glabrous. Leaves coriaceous, glabrous, olivaceous and shining on the upper surface when dry, the lower surface brown, midrib and lateral nerves rather densely pubescent with short hairs, 10 to 15 cm long, 4 to 5.5 cm wide, apex rather abruptly acuminate, base rounded; lateral nerves about 11 on each side of the midrib, very prominent on the lower surface, anastomosing; petioles prominently rugulose when dry, pubescent, rather stout, 7 to 10 mm long. Staminate flowers in axillary fascicles, their pedicels 1.5 to 3 mm long. Sepals oblong-elliptic, rounded, 3 to 3.5 mm long, densely cinereous-puberulent externally. Petals oblong-spatulate, apex rounded, base long-narrowed, densely ferruginous-villous, about 4.5 mm long. Glands oblong, glabrous, 1 mm long. Staminal column 5 to 6 mm long, shortly stipitate, much narrowed below, densely ferruginous-villous; anthers 8, about 1 mm long, their short free filaments densely villous, 1 mm long or less. Arms of the rudimentary ovary slender, glabrous, about 1 mm long.

SARAWAK, Baram District, Miri River, *Hose 676*, April 25, 1895.

Trigonopleura borneensis is the third species for the genus, one being known from the Malay Peninsula, and one from Mindanao, Samar, and Leyte in the Philippines. The form above described is very distinct from the other two, well characterized by its leaves being pubescent beneath, with more numerous lateral nerves; its spatulate petals; and its staminal column distinctly thickened upward, not cylindric.

TRIGONOPLEURA DUBIA (Elm.) comb. nov.

Alsodeia dubia Elm. Leafl. Philip. Bot. 8 (1915) 2875 (March 27).
Trigonopleura philippinensis Merr. in Philip. Journ. Sci. 10 (1915) Bot. 275 (August 9).

MINDANAO, Province of Agusan, Cabadbaran, *Elmer 13956* (type number of *Alsodeia dubia* Elm.). SAMAR, *Bur. Sci. 17457 Ramos* (type of *Trigonopleura philippinensis* Merr.). LEYTE, *Wenzel 709,854,935.*

Opportunity is here taken to adjust the synonymy of the Philippine species, as it was nearly simultaneously described both by Mr. Elmer and by me; Mr. Elmer's specific name being the older, is here adopted.

The material on which *Alsodeia dubia* was based presents only staminate flowers, but it is *Trigonopleura*, not *Alsoidea*, and matches *Trigonopleura philippinensis* Merr. in all respects. While placed by Mr. Elmer in the *Violaceae*, it is evident from his statement regarding it that he was very uncertain as to its true position: "Rather uncertain as to the right family and may possibly belong to *Flacourtiaceae* or rather to *Icacinaceae*."

LEGUMINOSAE

BAUHINIA Linnaeus

This genus seems to be rather highly developed in number of species in Borneo. Those previously credited to the island are as follows: *Bauhinia acuminata* Linn., *B. brachyscypha* Baker, *B. burbidgei* Stapf (*B. creaghii*

Baker ex descr. is probably a synonym), *B. diptera* Blume, *B. elongata* Korth., *B. excelsa* Blume (*B. ferruginea* Korth., non Roxb.), *B. excurrens* Stapf, *B. finlaysoniana* Grah., *B. foraminifer* Gagnep., *B. kingii* Prain, *B. macropoda* Blume, *B. menispermacea* Gagnep., *B. semibifida* Roxb., and *B. stenostachya* Baker. More than one-half of these are known only from Borneo. The species proposed below are apparently distinct from the above-listed species, and from all other described Malayan forms. Several of the above species, notably *Bauhinia burbidgei* Stapf, *B. foraminifer* Gagnep., and *B. menispermacea* Gagnep., are represented in our recently collected material by fine series of specimens.

BAUHINIA BORNEENSIS sp. nov. § *Phanera.*

Frutex scandens, ramulis inflorescentiisque dense subferrugineo-pubescentibus; foliis late ellipticis, coriaceis usque ad 8 cm longis, basi cordatis, 11- ad 15-nerviis, subtus minute pubescentibus, apice usque ad $\frac{1}{3}$ vel $\frac{1}{4}$ divisis, lobis late rotundatis; racemis terminalibus, floribus longe pedicellatis, saltem 2.5 cm longis, petalis extus parcissime longe pilosis glabrescentibus.

A scandent shrub, the younger parts and the inflorescence densely pubescent with brown or ferruginous short hairs. Branches terete, brown, glabrous, lenticellate. Leaves coriaceous, broadly elliptic, 5 to 8 cm long, 4 to 8 cm wide, the upper surface dark-brown, glabrous, the lower minutely appressed ferruginous-pubescent, base cordate, 11- to 15-nerved, apex divided from one-fourth to one-third to the base, the sinus narrow, lobes equilateral, broadly rounded; petioles 2 to 3.5 cm long, ultimately glabrous. Racemes terminal, simple, densely pubescent, up to at least 20 cm in length, the pedicels densely pubescent, 3 to 4 cm long. Buds broadly clavate, the tube cylindric, somewhat gibbous at the base, 1 cm long, the limb oblong-cylindric, rounded or apiculate, just before anthesis about 2 cm long, striate. Sepals narrowly oblong, about 2.5 cm long, 6.5 mm wide, somewhat acuminate, coriaceous. Petals as long as the sepals, glabrous or with a very few, long, scattered hairs on the median portion of the back, the limb oblong to oblong-elliptic, rounded, up to 11 mm wide, base acute, claw 2 to 3 mm long. Fertile stamens 3; anthers oblong, 12 mm long. Ovary and stout style densely appressed ferruginous-pubescent.

SARAWAK, *Native collector 1906* (type), *1040, 1787, 1874* (Bur. Sci.); possibly referable here is *Hose 575* from Baram District, but in my specimen, which presents rather young buds, the petals are densely pubescent on the median part of the back.

A species in the group with *Bauhinia ferruginea* Roxb., from which it is distinguished by its petals being quite glabrous, or at most with very few, long, soft hairs on the median portions of the back, not densely tomentose.

BAUHINIA CARDIOPHYLLA sp. nov. § *Phanera.*

Frutex scandens, glaber; foliis late ovatis, usque ad 6 cm longis, integris, obtusis vel obtuse acuminatis, basi cordatis, 7-nerviis, subtus glaucescentibus; floribus racemosis, longe tenuiter pedicellatis, petalis oblongo-obovatis, circiter 11 mm longis. Species *B. menispermaceae* similis et affinis, differt foliis multo minoribus, floribusque minoribus.

A scandent cirrhiferous glabrous shrub, the branches and branchlets reddish-brown when dry, terete. Leaves subcoriaceous, broadly ovate, 3.5 to 6 cm long, 3 to 5 cm wide, base cordate, apex obtuse or obtusely acuminate, entire, the upper surface pale-brownish when dry, the lower glaucous; nerves 7, slender, none of them reaching the apex; petioles slender, 1 to 2 cm long. Racemes terminal, glabrous, rather few-flowered, the pedicels slender, elongated, up to 3.5 cm in length. Buds clove-shaped, the tube slender, 4 mm long, narrowed into the pedicel, the limb ovoid, subacute. Sepals reflexed, oblong-ovate, acute or slightly acuminate, about 4.5 mm long. Petals somewhat ferruginous-pilose on the back, unequal; two oblong-obovate, rounded or retuse, about 11 mm long and 5.5 mm wide, base gradually narrowed, acute; three oblong-oblanceolate, as long as the other two but 2.5 to 3.5 mm wide and obtuse to somewhat acuminate. Fertile stamens 3; filaments glabrous, about 5 mm long; anthers short, wider than long. Sterile filaments nearly as long as the fertile ones. Ovary and style glabrous. Disk ferruginous-villous.

SARAWAK, *Native collector 1858* (type), *1857* (Bur. Sci.); Baram District, *Hose 289*, October 26, 1894.

Manifestly closely allied to *Bauhinia menispermacea* Gagnep., which it greatly resembles, differing however in its much smaller size throughout; much smaller, thinner leaves, which are obtuse or blunt acuminate; smaller, few-flowered racemes; and smaller flowers. *Bauhinia menispermacea* Gagnep. is represented by *Native collector 129, 1282, 1954* (Bur. Sci.), Matang Road, March, 1912.

BAUHINIA HAVILANDII sp. nov. § *Phanera.*

Frutex ut videtur scandens parce pubescentibus; foliis oblongo-ovatis, acuminatis, integris, basi late rotundatis subcordatisque, 5- vel 7-nerviis, chartaceis, usque ad 10 cm longis; inflorescentiis terminalibus, racemosis vel depauperato-paniculatis, dense multifloris, bracteis bracteolisque linearibus; petalis oblongo-obovatis ad oblongo-spatulatis, circiter 7.5 mm longis, crispatis, obtusis, extus pallide pilosis; ovario dense hirsuto.

A shrub; apparently scandent, the branchlets, inflorescences,

and petioles sparingly ferruginous-pubescent, the branches and branchlets brown or dark-brown when dry. Leaves chartaceous, brown and shining when dry, oblong-ovate, entire, acuminate, 7 to 10 cm long, 3.5 to 5 cm wide, glabrous, base broadly truncate-rounded and often shallowly cordate, prominently 5- or 7-nerved; petioles pubescent, 1 to 2 cm long. Inflorescence terminal, a simple raceme or with one or two branches from the base, up to 7 cm in length, rather densely many-flowered, the rachis and pedicels appressed-pubescent with rather pale hairs, the bracts and bracteoles linear, pubescent. Pedicels slender, about 2 cm long. Buds somewhat clove-shaped, the tube slender, narrowed below to the pedicel, 2 to 3 mm long, the limb oblong-ovoid, narrowed at both ends, acute, pale-pubescent externally with grayish or cinereous, short hairs. Sepals lanceolate, acuminate, reflexed, about 6 mm long. Petals subequal, 7 to 8 mm long, oblong-obovate to oblong-spatulate, much crisped, obtuse, base narrowed, acute, rather densely pale appressed-pilose externally, the claw 1 to 2 mm long. Fertile stamens 3; filaments slender, glabrous, about 6 mm long; anthers broadly ellipsoid, 1.7 mm long. Ovary shortly stipitate, inequilateral, oblong, densely pale-hirsute, about 4 mm long, much shorter than the style, which is glabrous above, hirsute below.

SARAWAK, *Native collector 199* (Bur. Sci.).

Well characterized by its entire, acuminate, glabrous leaves; its densely flowered inflorescence; pointed buds, the tube short, gradually narrowed to the pedicel; and its densely hirsute ovaries. It does not seem to be closely allied to any other Bornean species.

BAUHINIA HOSEI sp. nov. § *Phanera.*

Frutex scandens partibus junioribus inflorescentiisque dense cupreo-ferrugineo-pubescentibus; foliis oblongo-ovatis, coriaceis, in siccitate brunneis, usque ad 9 cm longis, basi 5-nerviis, cordatis, apice acuminatis retusisque; inflorescentiis racemosis, floribus longe pedicellatis; petalis extus parce ferrugineo-pubescentibus, obovatis, usque ad 16 mm longis, rotundatis; antheris circiter 2 mm diametro; ovario deorsum dense piloso, sursum glabro.

A scandent shrub, the younger parts and inflorescence densely pubescent with short, mostly appressed, shining, cupreous-ferrugineous hairs. Branches brown, smooth, glabrous, terete. Leaves thickly coriaceous, oblong-ovate, 7 to 9 cm long, 4 to 5.5 cm wide, base rounded, prominently cordate, 5-nerved, apex acuminate, the acumen slightly retuse, the upper surface quite glabrous, the lower surface similar in color, pubescent on the nerves, ultimately glabrous or nearly so; petioles densely pub-

escent, 1 cm long or less. Racemes terminal, solitary, sometimes with one or two short basal branches, all parts densely pubescent, the pedicels slender, up to 5 cm in length. Buds clove-shaped, densely pubescent, the tube cylindric, slender, 8 to 10 mm long, the limb ovoid. Sepals oblong-ovate, obscurely acuminate, about 8 mm long. Petals externally slightly appressed-ciliate, obovate, about 16 mm long, the limb broad, rounded, up to 14 mm wide, the claw stout, 2 to 4 mm long, base slightly narrowed, rounded. Fertile stamens three, stout, glabrous, about 10 mm long; anthers suborbicular, 2 mm in diameter; sterile filaments seven, 6 to 7 mm in length. Ovary oblong, appressed ferruginous-pubescent especially in the lower part and along the margins, glabrous above; style short, glabrous.

SARAWAK, Baram District, Marudi, *Hose 254*, June 12, 1895.

A species belonging in the group with *Bauhinia pyrrhaneura* Korth., but with shorter petioles, fewer nerves, and obscure reticulations. It also resembles *Bauhinia bidentata* Jack, but differs from that species in many characters.

BAUHINIA MEGALANTHA sp. nov. § *Phanera*.

Frutex scandens ramulis inflorescentiis floribusque dense adpresse ferrugineo-tomentosis; foliis chartaceis, late ellipticis, 9- vel 11-nerviis, usque ad 10 cm longis, basi late rotundatis, foliolis usque ad $\frac{4}{5}$ connatis, apice rotundatis; inflorescentiis terminalibus, racemosis, paucifloris, floribus magnis, usque ad 8 cm longis, longe pedicellatis, sepalis petalisque extus dense ferrugineo-tomentosis.

A scandent shrub, the younger parts and the inflorescence densely ferruginous-pubescent with short, appressed hairs. Branches terete, brown, becoming quite glabrous. Leaves broadly elliptic, chartaceous, 7 to 10 cm long, 6 to 8 cm wide, the upper surface brownish-pruinose when dry, quite glabrous, the lower paler and appressed-pubescent with scattered, short, brownish hairs, base broadly rounded, sometimes very shallowly cordate, 9- or 11-nerved, apex cleft about one-fifth to the base, the lobes rounded, the sinus very narrow, the midrib excurrent as a slender, somewhat pubescent, 4 to 5 mm long mucro; petioles slender, 3 to 5 cm long. Racemes terminal, solitary, few-flowered, the axis 8 to 20 cm long, and with the pedicels, calyx, and petals densely appressed ferruginous-pubescent with short hairs, the pedicels about 5 cm in length. Buds widely clavate, the tube cylindric, slightly gibbous at the base, 1.5 to 2 cm long, rather abruptly enlarged at the base of the oblong, acute limb. Sepals 4.5 to 5 cm long, about 8 mm wide, coriaceous, acuminate, at least twice as long as the tube. Petals subequal, about 5

cm long, 1.5 to 1.8 cm wide, narrowly oblong to narrowly oblong-obovate, rounded at the apex, base acute, densely pubescent outside, glabrous within, the claw stout, 4 to 5 mm long. Fertile stamens 3; filaments glabrous; anthers narrowly oblong, 2.2 cm long. Ovary rather long-stipitate, all parts, including the stipe and the stout style, densely ferruginous-pubescent.

SARAWAK, Baram District, Entoyut River, *Hose 163*, November 10, 1894.

A species well characterized by its large flowers, belonging in the group with *Bauhinia exelsa* Blume (*B. ferruginea* Korth., non Roxb.), from which it is easily distinguished by its slender, much longer petioles.

BAUHINIA MOULTONII sp. nov. § *Phanera.*

Frutex scandens, ramulis subtus foliis inflorescentiisque ferrugineo-pubescentibus; foliis coriaceis, suborbicularis, usque ad 9 cm diametro, prominente 7- vel 9-nerviis, basi cordatis, apice breviter lobatis, lobis rotundatis; floribus racemosis, racemis paucifloris; petalis oblongis ad anguste oblongis, circiter 12 mm longis, extus parce pilosis; staminibus fertilibus 3, antheris latis; ovario glabro.

A scandent shrub, the branchlets, petioles, lower surface of the leaves, and the inflorescence more or less ferruginous-pubescent, the branches and branchlets terete, brown in color, the former ultimately glabrous. Leaves suborbicular, rather thickly coriaceous, 5 to 9 cm long, base prominently cordate, divided one-fourth to the base or less, the sinus narrow, lobes broadly rounded, prominently 7- or 9-nerved, the primary reticulations lax, prominent, the secondary ones obsolete or nearly so, the upper surface brown when dry, glabrous, the lower somewhat paler, rather uniformly pubescent with scattered, short, brown hairs; petioles 2 to 5 cm long. Racemes ferruginous-pubescent, short, rather few-flowered, the lower pedicels longer than the upper ones, deciduous, slender, up to 2 cm in length. Buds clove-shaped, the tube slender, cylindric, 2 to 4 mm long, rather densely pubescent, the limb ovoid, slightly pubescent or nearly glabrous. Sepals oblong-ovate, acute or slightly acuminate, 5 to 6 mm long, in anthesis spreading or somewhat reflexed. Petals oblong to narrowly oblong, about 11 mm long, 4 to 5 mm wide, sparingly pilose on the back with long scattered hairs, the base acute, the claw 1 mm long or less. Disk ferruginous-villous. Ovary oblong, compressed, glabrous, about as long as the style. Fertile stamens 3, the anthers wider than long.

SARAWAK, *Native collector 201, 202* (type) (Bur. Sci.).

Apparently quite distinct from the other described Bornean and Malayan forms, characterized by its shortly lobed, pubescent, cordate, rather thickly

coriaceous leaves, the lobes rounded; its short racemes with clove-shaped buds, rather long pedicels, glabrous ovary; and anthers wider than long.

ERYTHROPHLOEUM Afzelius

ERYTHROPHLOEUM DENSIFLORUM (Elm.) Merr. in Philip. Journ. Sci. 4 (1910) Bot. 267.

Cynometra densiflora Elm. Leafl. Philip. Bot. 1 (1907) 222.

BRITISH NORTH BORNEO, Sebatik Island, *Villamil 52*, September 26, 1915, locally known as *miamot*.

Previously known only from the Philippines, where it is widely distributed. The specimen is sterile, but is unquestionably identical with the Philippine form. Doctor Foxworthy notes that the wood structures is also identical with the Philippine form.

CRUDIA Schreber

CRUDIA TENUIPES sp. nov.

Arbor glabra ramis ramulisque tenuibus; foliis plerumque 4-foliolatis, foliolis alternis, firme chartaceis, oblongo-ellipticis, prominente acuminatis, basi acutis ad rotundatis, usque ad 10 cm longis, nervis primariis utrinque circiter 7, tenuibus; racemis circiter 6 cm longis, floribus longissime tenuiterque pedicellatis, pedicellis 2 ad 3 cm longis, sepalis reflexis, oblongo-ovatis, 4 mm longis, ovario dense ferrugineo-piloso.

A glabrous tree, the branches and branchlets very slender, terete, brownish, smooth, the ultimate branches less than 1.5 mm in diameter. Leaves alternate, 15 to 18 cm long, the rachis 4 to 6 cm long, not produced beyond the last leaflet; leaflets usually 4, alternate, oblong-elliptic, firmly chartaceous, glabrous, 7 to 10 cm long, 3 to 5 cm wide, apex prominently acuminate, the acumen usually about 1 cm long, rather slender, blunt, base acute to rounded, upper surface brownish when dry, the lower faintly glaucous; primary lateral nerves about 7 on each side of the midrib, slender, anastomosing, scarcely more prominent than are the secondary ones and primary reticulations; petiolules about 3 mm long. Racemes on the ultimate branchlets solitary, opposed to the ultimate leaf, about 6 cm long, the rachis and peduncle slender, the pedicels of the flowers very slender, 2 to 3 cm long, each with a minute bracteole, or its scar, at about the lower third or fourth. Calyx-tube nearly 2 mm long, the lobes 4, reflexed, glabrous, about 4 mm long, oblong-ovate, obtuse or rounded, reflexed, brown when dry. Ovary oblong-ovoid, about 3 mm long, densely ferruginous-pilose, narrowed upward, the style slender, about 7 mm long, pubescent below, glabrous above; ovules 2 or 3.

SARAWAK, *Native collector 1385* (Bur. Sci.).

A species very readily distinguished from all described forms by its very slender, much-elongated pedicels, which vary in length from 2 to 3 cm. It is not closely allied to the only other known Bornean species, *Crudia havilandii* Prain. A third species is represented by *Native collector 688* (Bur. Sci.), but the material available is hardly sufficient to warrant describing it at this time.

PELTOPHORUM Walpers

PELTOPHORUM RACEMOSUM sp. nov.

Arbor, ramulis petiolis inflorescentiisque ferrugineo-pubescentibus; foliis circiter 25 cm longis, circiter 5-jugatis; foliolis oblongo-ellipticis, coriaceis late rotundatis apiculatisque, basi subacutis, aequilateralibus vel leviter inaequilateralibus, circiter 10-jugatis, usque ad 3 cm longis; inflorescentiis axillaribus, solitariis, racemosis, quam foliis brevioribus, floribus circiter 2.5 cm diametro.

A tree, the younger branchlets, petioles, and inflorescences prominently ferruginous-pubescent. Leaves about 25 cm long, bipinnate, the pinnae usually 5 pairs, 8 to 12 cm long, their rachises ferruginous-pubescent. Leaflets oblong-elliptic, coriaceous, equilateral or nearly so, 2 to 3 cm long, 8 to 12 mm wide, apex broadly rounded, minutely apiculate, base subacute, margins usually revolute, the upper surface dark-brown and shining when dry, the lower paler, uniformly and rather densely pubescent with short subferruginous hairs. Inflorescence racemose, the racemes axillary, solitary, about 14 cm long, ferruginous-pubescent. Pedicels slender, about 1 cm long. Calyx densely ferruginous-pubescent, the tube very short, nearly flat, 4 to 5 mm in diameter, the lobes oblong, rounded, about 1 cm long. Petals obovate, much wrinkled, rounded, pubescent on the back, about 1.5 cm long. Stamens about 1 cm long, the filaments much thickened and densely villous at the base, glabrous above; anthers versatile, oblong, 4 mm in length. Ovary and style pubescent.

SOUTHEASTERN BORNEO, Hayoep, *Winkler 2424*.

Distinguished from all the oriental species of the genus by its racemose inflorescence, few pinnae, comparatively few, relatively rather large, and nearly equilateral leaflets.

PELTOPHORUM INERME (Roxb.) Naves in Blanco Fl. Filip. ed. 3, *pl. 335*, ex F.-Vill. Novis. App. (1880) 69 in syn. (*P. ferrugineum* Benth.).

SARAWAK, near Kuching, *Sarawak Museum 11;* near Mount Santubong, *Native collector 2373* (Bur. Sci.); Miri River, *Hose 562, 685*, January, April, 1895.

Malay Peninsula and Indo-China to the Philippines, Malaya, and northeastern Australia.

INTSIA Thouars

INTSIA BAKERI Prain in Sci. Mem. Med. Off. Army Ind. 12 (1901) 13.

SARAWAK, Baram, *Foxworthy 482*, there known as *miraboo*.
Siam, Malacca, and the Andaman Islands; new to Borneo.

INTSIA RETUSA (Kurz) O. Ktze. Rev. Gen. Pl. 1 (1891) 192.

SARAWAK, Baram District, *Hose 507;* British North Borneo, near Sandakan, *Villamil 52*, sterile.

Delta of the Ganges, the Andaman Islands, Malay Peninsula, and Cochinchina; new to Borneo.

MEZONEURUM Desfontaines

MEZONEURUM PLATYCARPUM sp. nov. § *Eumezoneurum.*

Frutex scandens, aculeatus, partibus junioribus subtus foliolis inflorescentiisque plus minusve brunneo-puberulis vel pubescentibus; foliolis alternis, subcoriaceis, usque ad 4.5 cm longis, oblongo-ellipticis ad obovatis, apice late rotundatis vel subtruncatis, basi inaequilateralibus; floribus circiter 15 mm longis, extus dense cinereo- vel griseo-puberulis, calycis tubo valde obliquis, gibbosis; petalis valde inaequalibus; fructibus inaequilateraliter oblongo-obovoideis, circiter 12 cm longis et 5.5 cm latis, glabris, nitidis, seminibus circiter 5.

A scandent aculeate shrub, the younger parts, lower surface of the leaflets, and the inflorescence brownish- or griseous-puberulent. Leaves apparently large, bipinnate, the rachis with retrorse spines. Leaflets numerous, alternate, subcoriaceous, oblong-elliptic to obovate, 2 to 4.5 cm long, 1.2 to 3 cm wide, apex broadly rounded or subtruncate, the midrib forming sometimes a very short apiculus, base usually distinctly inequilateral, rounded or slightly cordate, the lamina on one side extending farther along the petiolule than on the other, the upper surface glabrous, shining, nearly black when dry, the lower puberulent; lateral nerves 7 to 9 pairs, rather slender, anastomosing, scarcely more distinct than are the secondary ones and the primary reticulations; petiolules about 2 mm long. Flowers numerous, somewhat crowded on the racemelike branches of the inflorescence, their pedicels pubescent, about 10 mm long, the flowers about 15 mm long. Calyx-tube very oblique, gibbous, 4 to 5 mm long, externally densely puberulent, about 7 mm in diameter, the lobes very unequal, the larger one broadly obovate, rounded, puberulent, concave, about 7 mm long and 6 mm wide, two lateral ones about 5 mm long and 3.5 mm wide, elliptic-ovate, rounded, the remaining two suborbicular, 4 to 5 mm in diameter. Petals very unequal, one about 10 mm long and 8 mm wide, glabrous, prominently two-lobed, when spread about 8 mm wide, the lobes some-

what falcate, rounded, divaricate, the sinus with a short stipitate process, base much narrowed into the stout, 6 mm long claw, the other four petals subequal, oblong, acuminate, about 4 mm long. Filaments stout, 10 to 12 mm long, below clothed with long hairs. Ovary narrowly oblong, pubescent, somewhat compressed, including the pubescent style about 13 mm in length. Pod brown and shining when dry, about 12 cm long and 5.5 cm wide, inequilaterally oblong-obovate, slightly curved along the winged side, broadly curved along the other, slightly reticulate, with a short pubescent apiculus, the wing about 1 cm wide; seeds about 5.

SARAWAK, Baram District, Miri River, *Hose 70*, January, 1895.

The first representative of the genus reported from Borneo, well characterized by its broad pods and very unequal petals.

PAHUDIA Miquel

PAHUDIA ACUMINATA sp. nov.

Arbor, inflorescentiis exceptis glabra; foliis circiter 20 cm longis, 3-jugis, foliolis firme chartaceis, oblongis ad oblongo-ovatis, nitidis, usque ad 10 cm longis, tenuiter acute acuminatis, basi acutis ad rotundatis, subtus pallidis, nervis primariis utrinque circiter 10, tenuibus; inflorescentiis cinereo-pubescentibus, paucifloris, depauperato-paniculatis, circiter 6 cm longis; petalis 1 vel interdum 2, superioribus flabelliformis, circiter 12 mm longis, longe unguiculatis, inferioribus lineari-spatulatis; staminibus fertilibus 7, usque ad 6 cm longis; ovario circiter 2 mm longo, stylis brevissimis.

A tree, glabrous except the inflorescence. Leaves pinnate, about 20 cm long, the leaflets 6, opposite, firmly chartaceous, shining and brownish-olivaceous on the upper surface, the lower surface pale, oblong to oblong-ovate, 7 to 10 cm long, 4 to 7 cm wide, base acute, apex long and slenderly acuminate, the acumen up to 1.5 cm in length, acute; lateral nerves about 10 on each side of the midrib, slender, anastomosing, scarcely more distinct than are the secondary nerves and primary reticulations; petiolules 2 to 3 mm long. Inflorescence a depauperate, few-flowered panicle, or reduced to a few fascicled racemes, excluding the flowers about 6 cm in length, all parts rather densely cinereous-pubescent with short hairs. Bracts in general broadly ovate, subpersistent, rounded or obtuse, about 6 mm long, often wider than long, densely pubescent. Calyx-tube about 5 mm long; outer two sepals narrowly elliptic, about 8 mm long and 4 mm wide, rounded, the inner two broadly elliptic, about 9 mm long and 6 to 7 mm wide, all pubescent. Upper petal about 12

mm long, puberulent, the limb flabellate, 7 to 8 mm wide, broadly rounded, base much narrowed, the claw about 6 mm long, pubescent below; inferior petal, when present, linear-spatulate, up to 7 mm in length. Stamens 9, the upper two sterile, very slender, 2 to 3 mm long, the lower seven much elongated, somewnat ciliate near the base, about 6 cm long. Ovary shortly stipitate, oblong, compressed, including the strongly incurved or involute style about 2 mm long, pubescent along one side, the stipe short, pubescent.

SARAWAK, Baram District, Baram, *Hose 93*, March, 1895.

The first representative of the genus known from Borneo, in appearance resembling *Pahudia javanica* Miq. and *P. rhomboidea* Prain. It differs from both in its fewer leaflets which are prominently and slenderly acute-acuminate, not blunt-acuminate or retuse, but especially from the above two forms and the other known representatives of the genus in its very short style, which is at most 1 mm in length.

FLEMINGIA Roxburgh

FLEMINGIA MACROPHYLLA (Willd.) O. Ktze. ex Prain in Journ. As. Soc. Beng. 66[2] (1897) 440, in nota; cf. Merrill in Philip. Journ. Sci. 5 (1910) Bot. 130 (*F. congesta* Roxb.).

SARAWAK, Lundu, *Foxworthy 404*, June, 1908; Baram District, *Hose 215*, November 30, 1894.

New to Borneo; India to southern China, the Philippines, and Malaya.

ALBIZZIA Durazzini

ALBIZZIA SCANDENS Merr. in Philip. Journ. Sci. 4 (1909) Bot. 265.

SARAWAK, Baram District, *Hose 523*, *691*, January and April, 1895.

Previously known only from Palawan. The Sarawak specimens very closely match the type.

DALBERGIA Linnaeus f.

DALBERGIA SUBALTERNIFOLIA (Elm.) Merr. in Philip. Journ Sci. 10 (1915) Bot. 15.

SARAWAK, without definite locality, *Native collector 1891* (Bur. Sci.).

This specimen certainly represents the same species as our Palawan material. It is characterized by its trifoliolate leaves, belongs in the section *Amerimnon, Endespermum,* and is allied to *Dalbergia densa* Benth.

DALBERGIA SIMPLICIFOLIA sp. nov. § *Amerimnon, Endespermum.*

Species praecedente similis et valde affinis, differt foliis omnibus 1-foliolatis inflorescentiis multo brevioribus.

Apparently scandent, glabrous except the young branchlets and the inflorescence. Branches terete, rugose when dry, lenticellate, brown in color. Leaves all simple, elliptic to oblong-elliptic, 7 to 13 cm long, 3.5 to 7 cm wide, castaneous and shining when dry, base rounded, apex rather prominently blunt-acuminate, the lower surface slightly pubescent along the midrib when

young, becoming quite glabrous; lateral nerves about 7 on each side of the midrib, slender, not prominent; petiole, including the petiolule, 1 to 1.5 cm long. Inflorescence axillary, cymose, ferruginous-pubescent, 2 to 3 cm long. Flowers about 6 mm long, their pedicels 1 to 2 mm in length, sparingly pubescent. Calyx somewhat cup-shaped, 3.5 mm long, sparingly appressed-pubescent, shortly 5-toothed, three of the teeth narrower than the other two. Petals sparingly pubescent externally. Standard with an orbicular, rounded limb about 3 mm in diameter, reflexed in anthesis, the claw slender. Keel petals as long as the standard, prominently hastate or appendaged at the base, the claw slender, 2.5 mm long, the limb inequilateral, oblong-obovate, somewhat falcate, rounded. Stamens united into two phalanges of four each, with an intermediate one between the phalanges, the vexillary filament wanting. Ovary narrowly oblong, stipitate, densely and minutely ferruginous-pubescent, the style subulate, about 2 mm long.

SARAWAK, Baram District, Miri, *Hose 678*, April, 1895.

A species well characterized by its unifoliolate leaves; the single leaflet comparatively large, castaneous and shining when dry, and of nearly the same color on both surfaces; and its short inflorescences. It is manifestly very closely allied to *Dalbergia subalternifolia* (Elm.) Merr. of Palawan and Sarawak, which, however, has much longer inflorescences and 3-foliolate leaves.

PTEROLOBIUM R. Brown

PTEROLOBIUM BORNEENSE sp. nov.

Frutex scandens, aculeatus, inflorescentiis foliisque exceptis glaber; foliis circiter 20 cm longis, rhachibus griseo-puberulis, pinnis circiter 10-jugatis, 4 ad 6 cm longis; foliolis 10- ad 14-jugatis, glabris, anguste oblongis, circiter 1 cm longis, 3 ad 4 mm latis, apice rotundatis, leviter retusis, basi inaequilateralibus; inflorescentiis dense pubescentibus, circiter 20 cm longis, floribus numerosis; leguminis glabris, 5 cm longis, circiter 1.4 cm latis, basi turgidis, obscure reticulatis, apice late rotundatis, lateraliter apiculatis.

A scandent shrub, the branches terete, smooth, dark-colored, glabrous, somewhat pruinose when dry, armed with short reflexed spines at the nodes. Leaves about 20 cm long, the rachis with short retrorse spines at the nodes, griseous-puberulent as are also the rachises of the pinnae; pinnae about 10 pairs, 4 to 6 cm long; leaflets 10 to 14 pairs, narrowly oblong, glabrous, dark-brown when dry, about 1 cm long, 3 to 4 mm wide, apex rounded, usually retuse and sometimes with a minute apiculus, base inequilateral, rounded, the lamina extending farther along the petiolule

on one side than on the other, nerves ad reticulations obsolete. Panicles terminal, about 20 cm long, the branches rather few, densely brownish-pubescent with short hairs, densely many-flowered. Flowers not seen. Pedicels in fruit pubescent, 3 to 4 mm long; persistent calyx sparingly rusty-pubescent, inequilateral, 3 to 4 mm in diameter. Pods glabrous, about 5 cm long, 1.4 cm wide, the basal seed-bearing portion somewhat turgid, nearly black when dry, very obscurely reticulate, subrhomboid-ovate in outline, about 1.5 cm long and 1.2 cm wide, the wing brown, shining, the upper side slightly curved, the style subpersistent as a long slender apiculus up to 1.5 cm long, falling and leaving a very short apiculus, the wing broadly rounded at the apex, slightly narrowed above.

SARAWAK, Baram District, Lio-matu, *Native collector 2761* (Bur. Sci.) (original number 12) October 29, 1914.

A species manifestly allied to *Pterolobium densiflorum* Prain of the Malay Peninsula and *P. microphyllum* Miq. of Java. From the former it is distinguished by its shorter pinnae; rather fewer leaflets, which are smaller in size; its shorter inflorescence; and its rather wider wing, which is distinctly curved along the upper margin and not narrowly rounded at the apex. From Miquel's species it is distinguished by its fewer pinnae and leaflets, larger leaflets, and pubescent pedicels.

SPATHOLOBUS Hasskarl

SPATHOLOBUS OBLONGIFOLIUS sp. nov.

Frutex scandens partibus junioribus inflorescentiisque exceptis glaber; foliolis oblongis, usque ad 22 cm longis, acuminatis, basi acutis, nervis utrinque 9, prominentibus, adscendentibus, rhachibus haud productis; paniculis axillaribus, dense tomentosis, suppyramidatis, pedunculatis, circiter 20 cm longis, floribus circiter 8 mm longis, in ramulis ultimis racemose dispositis; fructibus junioribus dense adpresse tomentosis.

Scandent, glabrous or nearly so except the younger parts and the densely tomentose inflorescences. Branches terete, lenticellate. Petioles glabrous, 5.5 to 7 cm long, not produced beyond the lateral leaflets, the stipels linear, about 3 mm long; leaflets oblong, subequally narrowed to the acute base and the rather prominently acuminate apex, pale or brownish and shining when dry, 18 to 20 cm long, 5 to 6.5 cm wide, coriaceous, the terminal one equilateral, the others more or less inequilateral, their petiolules black when dry, 8 to 10 mm long; lateral nerves 9 on each side of the midrib, prominent, ascending. Panicles axillary, about 20 cm long, peduncled, subpyramidal, the rachis and branches rather densely tomentose with spreading ferruginous hairs, these in age becoming rather pale. Flowers racemosely

disposed on the ultimate branchlets, about 8 mm long, their pedicels ferruginous-tomentose, about 2 mm long, the bracteoles minute, about 0.5 mm long. Calyx 4 mm long, pubescent, the lobes oblong, acute or acuminate, nearly 2 mm long, the upper two connate into a notched or retuse lobe. Standard 9 mm long, the limb orbicular, retuse, 5 to 6 mm in diameter, the claw slender. Wings and keel similar, oblong to oblong-obovate. Ovary pubescent, narrowly oblong. Young fruit membranaceous, narrowly oblong-obovate to oblong, inequilateral, apex slightly falcate-rounded and apiculate, rather densely appressed-pubescent with pale-ferruginous hairs, when very young about 3 cm long and 1 cm wide, apparently much larger at maturity.

SARAWAK, Baram District, Mount Skiwa, *Hose 441*, December, 1894, in fruit; Apoh River, *Hose 486* (type), in flower, November 20, 1894.

A species well characterized by its tomentose inflorescence, its oblong, subequally narrowed leaves, and by the rachis not being produced beyond the lateral leaflets. In the last character this species approaches *Spatholobus bracteolatus* Prain of Perak; however, it is otherwise quite different from Prain's species.

SPATHOLOBUS AFFINIS sp. nov.

Species praecedente affinis, differt rhichibus supra foliolis lateralibus distincte productis, petiolo usque ad 15 cm longo, foliolis majoribus, usque ad 9 cm latis, paniculis minus pubescentibus, calycis lobis superioribus integris, haud retusis.

Scandent, glabrous except the inflorescence. Leaves 3-foliolate, the petioles about 15 cm long, the rachis produced 1.5 cm above the insertion of the lateral leaflets. Leaflets coriaceous, lateral ones more or less inequilateral, the terminal equilateral, subolivaceous and shining when dry, base acute, apex acuminate, up to 25 cm long and 9 cm wide, the lateral nerves ascending, prominent, 9 or 10 on each side of the midrib; petiolules stout, 10 to 12 mm long. Inflorescences tripinnately paniculate, axillary, branched from the base, pyramidal, appressed subferruginous-pubescent. Flowers about 9 mm long, very similar to those of the preceding species, but the upper lobe of the calyx quite entire.

SARAWAK, Baram District, Mount Trekan, *Hose 632*, July, 1895, altitude about 600 meters.

Manifestly closely allied to *Spatholobus oblongifolius* Merr., but distinguished by its produced leaf rachis, much longer petioles, broader leaflets, and entire, not retuse or notched upper calyx-lobe.

SPATHOLOBUS GYROCARPUS (Wall.) Benth. Pl. Jungh. (1852) 238.

SARAWAK, Baram District, Lio-matu, *Native collector 2775* (Bur. Sci), October 31, 1914.

Malay Peninsula and Luzon; new to Borneo. The specimen differs from

our Philippine material somewhat in leaf-shape, and in its duller indumentum, while the flowers are nearly sessile. Other than the three species considered above, and *S. ferrugineus* Benth., represented by *Native collector 690* from near Kuching, there are at least three other distinct species represented in our Bornean collections, but the specimens are rather inadequate.

DERRIS Loureiro

DERRIS ELEGANS (Grah.) Benth. Pl. Jungh. (1852) 252.

SARAWAK, Baram District, *Hose 361*, January, 1895.

Tenasserim to the Andaman Islands, the Malay Peninsula, Sumatra, and the Philippines; new to Borneo.

DERRIS DIADELPHA (Blanco) Merr. in Philip. Journ. Sci. 5 (1910) Bot. 103 (*D. sinuata* Wall.).

SARAWAK, near Kuching, *Native collector 692, 1405* (Bur. Sci.).

Ceylon and India to Indo-China, the Philippines, and Malay Peninsula and Archipelago; new to Borneo.

FORDIA Hemsley

FORDIA ANGUSTIFOLIOLA sp. nov.

Arbor glabra vel subglabra; foliis usque ad 40 cm longis, foliolis circiter 17, estipellatis, coriaceis, lanceolatis vel anguste lanceolatis, usque ad 14 cm longis et 3 cm latis, tenuiter acuminatis, basi acutis, subtus pallidis, nervis utrinque circiter 8; racemis e ramis vetustioribus, usque ad 25 cm longis, multifloris; floribus circiter 1 cm longis, brevissime pedicellatis.

A nearly glabrous tree. Leaves up to 40 cm long, glabrous or nearly so. Leaflets about 17, coriaceous, estipellate, lanceolate to narrowly lanceolate, 10 to 17 cm long, 2.5 to 3 cm wide, apex rather slenderly acuminate, base acute, the upper surface rather pale when dry, the lower much paler than the upper; lateral nerves about 8 on each side of the midrib, prominent, curved; petiolules 5 mm long or less. Racemes from the older branches, solitary or in pairs, up to 25 cm in length, many-flowered, sparingly pubescent. Pedicels about 1 mm long, somewhat pubescent. Calyx cup-shaped, somewhat inequilateral, subtruncate, about 3 mm long and wide, the teeth broad, obscure, externally slightly pubescent. Standard externally subferrugineous-puberulent, about 10 mm long, 6 mm wide, retuse, spreading or reflexed in anthesis, narrowed below into a short, broad claw. Wings narrowly oblong, rounded, as long as the standard, about 1.8 mm wide, the claw slender, about 3 mm long; keel up to 2.5 mm wide, the claw equalling that of the wings. Stamens glabrous, the vexillary one free at the base, united with the others above. Ovary linear, minutely appressed-pubescent, narrowed upward into the slender curved style. Pod flat, about 2 cm wide, the valves much twisted when dry.

SARAWAK, Matang Road, *Native collector 198* (Bur. Sci.), January 3, 1911.

Closely allied to *Fordia coriacea* Dunn, but distinguished by its much more numerous, narrower, glabrous leaflets which are acute at the base, and by its longer racemes. I have before me a specimen of *Hose 75* on which Dunn's species was in part based.

CLITOREA Linnaeus

CLITOREA CAJANIFOLIA (Presl) Benth. in Mart. Fl. Bras. 15: 121.

SARAWAK, Santubong, *Foxworthy 422;* Tabaan, *Native collector 703, 1038, 1905* (Bur. Sci.).

A native of Brazil, now introduced and naturalized in Siam, the Malay Peninsula, Singapore, and Java; new to Borneo.

CANAVALIA DeCandolle

CANAVALIA LINEATA (Thunb.) DC. Prodr. 2 (1825) 404.

SARAWAK, Buntal, *Native collector 1636* (Bur. Sci.); Baram District, *Hose 54, 605*, January and April, 1895.

A littoral species of wide tropical distribution, not, however, before definitely recorded from Borneo.

CAESALPINIA Linnaeus

CAESALPINIA CRISTA Linn. Sp. Pl. (1753) 380 (*C. bonduc* L., *C. bonducella* Flem.).

SARAWAK, Santubong, *Native collector 2213* (Bur. Sci.), along the seashore. Tropics of the world.

DESMODIUM Desvaux

DESMODIUM GYROIDES (Roxb.) DC. Prodr. 2 (1825) 326.

SARAWAK, *Native collector 1410, 2025* (Bur. Sci.); Baram District, Miri River, *Hose 515*, January, 1895.

New to Borneo. India to Formosa, southward to New Guinea.

DESMODIUM UMBELLATUM (Linn.) DC. Prodr. 2 (1825) 325.

SARAWAK, *Native collector 1045, 1620, 2210* (Bur. Sci.); Baram District, *Hose 264*, December, 1894.

New to Borneo; along tropical shores, Mascarene Islands and India to southern China, northern Australia, and Polynesia.

DESMODIUM TRIFOLIASTRUM Miq. Fl. Ind. Bat. 1^1 (1855) 248.

SARAWAK, foot of Mount Santubong, *Native collector 2319* (Bur. Sci.), February–June, 1914.

Perak, Java, Mindanao, and New Guinea, probably also in other islands of the Malay Archipelago; new to Borneo.

FLACOURTIACEAE

CASEARIA Jacquin

CASEARIA ELLIPTIFOLIA sp. nov.

Arbor, foliis firme chartaceis, ellipticis, nitidis, subtus ad costa nervisque leviter pubescentibus, usque ad 11 cm longis, integris, basi acutis vel subacutis, apice late obtuse acuminatis, nervis utrinque circiter 8, prominentibus; floribus axillaribus, fascicu-

latis, breviter pedicellatis, 5-meris, sepalis late ovatis, punctatis; staminibus fertilibus 10, brevibus, staminoideis triangulari-ovatis, acutis, apice ciliatis; fructibus ovoideis vel subellipsoideis, circiter 1 cm longis, glabris.

A tree, the branchlets, petioles, and midrib and lateral nerves on the lower surface of the leaves more or less pubescent with short, subcinereous, appressed hairs, the older branchlets slender, terete, olivaceous, nearly glabrous. Leaves firmly chartaceous, elliptic, entire, 7 to 11 cm long, 3.5 to 5.5 cm wide, equilateral or nearly so, base acute or subacute, apex abruptly and obtusely short acuminate, the acumen often obscurely apiculate, shining, rather pale-olivaceous when dry; lateral nerves about 8 on each side of the midrib, prominent, slender, curved, scarcely anastomosing, the ultimate reticulations slender, close, subparallel; petioles 8 to 10 mm long, somewhat pubescent. Flowers in few-flowered, axillary fascicles, but one or two developing at one time, their pedicels sparingly pubescent, about 1.5 mm long, the subtending bracteoles broadly ovate, somewhat pubescent, 1 to 1.5 mm long. Calyx in fruit about 4.5 mm in diameter, the lobes somewhat pubescent, broadly ovate, usually obtuse, 1.5 to 2 mm long. Fertile stamens 10, about 1 mm long; staminodes triangular-ovate, acute, about 1 mm long, apex ciliate, the tube somewhat united with the calyx below. Fruit ovoid or somewhat ellipsoid, glabrous, somewhat rugose when dry, up to 1 cm in length; seeds 6, about 5 mm long, the aril not lacerate.

SARAWAK, Baram District, Miri River, *Hose 528*, January, 1895.

A species well characterized by its elliptic, entire leaves and its triangular-ovate, acute staminodes.

CASEARIA HOSEI *sp. nov.*

Arbor (vel frutex) ramulis subtus foliis ad costa nervisque floribusque plus minusve cinereo-puberulis, ramis teretibus, ramulis plus minusve angulatis; foliis integris, oblongis, acuminatis, firme chartaceis, nitidis, in siccitate brunneis, usque ad 17 cm longis, basi leviter inaequilateralibus, rotundatis ad subacutis, nervis utrinque circiter 9; floribus fasciculatis, breviter pedicellatis, 5-meris, staminibus 10.

A tree or shrub, the branchlets, lower surface of the leaves on the midrib and lateral nerves, and the flowers rather minutely cinereous-puberulent. Branches terete, glabrous or nearly so, very dark-brownish-red when dry, the branchlets nearly black. Leaves oblong, entire, firmly chartaceous, brown and shining when dry, 11 to 17 cm long, 3 to 6 cm wide, the upper surface quite glabrous, the lower puberulent on the midrib and lateral

nerves, apex distinctly acuminate, acumen usually blunt or slightly apiculate, base somewhat inequilateral, subacute to rounded; lateral nerves about 9 on each side of the midrib, prominent, curved and obscurely anastomosing, the reticulations fine; petioles puberulent, about 8 mm long. Flowers in axillary fascicles, the subtending bracteoles broadly ovate, acuminate, 1 mm long, slightly pubescent. Pedicels 1 to 1.5 mm long, cinereous-puberulent. Sepals 5, oblong, obtuse, about 2.5 mm long, externally sparingly cinereous-pubescent with short hairs. Stamens 10, the filaments alternately long and short, up to 1.5 mm in length, the alternating staminodes oblong-linear, densely villous at the apex, otherwise sparingly pubescent, about 1 mm long. Ovary narrowly ovoid, glabrous, the style slightly ciliate, the ovary and style about 2 mm long; stigma capitate.

SARAWAK, Baram District, Long Lama, *Hose 483* (type), October, 1894; Mount Murud, *Native collector 2932* (Bur. Sci.), December 6, 1914.

A species characterized by its oblong, entire, slightly inequilateral, acuminate leaves, which are puberulent on the midrib and lateral nerves beneath; its dark-colored, cinereous-puberulent branchlets; and 5-merous, puberulent flowers. Its innovations, including the very young leaves, are rather densely subferruginous pubescent.

CASEARIA MINUTIDENS sp. nov.

Arbor, ramulis subtus foliis ad costa nervisque floribusque prominente pubescentibus; foliis oblongis, firme chartaceis usque ad 10 cm longis, in siccitate brunneis, acuminatis, pellucido-punctatis, basi leviter inaequilateralibus, late rotundatis vel subtruncatis, margine minute glanduloso-denticulatis, nervis utrinque 7 ad 9, prominentibus; floribus fasciculatis, pedicellatis, 5-meris; staminibus fertilibus 10, staminoideis 0.3 mm longis, oblongis, truncatis, villosis; ovario dense villoso.

A tree, the younger parts, lower surface of the leaves on the midrib and lateral nerves rather prominently pubescent with short, spreading, yellowish-cinereous or cinereous hairs, the indumentum on the innovations somewhat ferruginous. Branches and branchlets slender, dark-colored when dry, the latter somewhat angular. Leaves pellucid-punctate, brownish when dry, firmly chartaceous, in general oblong to ovate-oblong, 6 to 10 cm long, 3 to 4.5 cm wide, dull or slightly shining when dry, base broad, abruptly rounded to subtruncate, slightly inequilateral, apex rather abruptly acuminate, the acumen 1 cm long or less, usually acute, margins with numerous, very minute, glandlike teeth, not at all crenulate, the upper surface glabrous or somewhat pubescent along the midrib; lateral nerves 7 to 9 on each side of the midrib, prominent, somewhat ascending, these with

the midrib and, to a less degree, the reticulations prominently pubescent; petioles pubescent, about 3 mm long. Flowers 5-merous, in axillary fascicles, their pubescent pedicels about 2 mm long. Sepals 5, elliptic, rounded, pubescent, 2 to 2.5 mm long. Fertile stamens 10, glabrous, the alternating staminodes forming a very short tube, narrowly oblong, truncate, villous at the tip, 0.3 mm long. Ovary narrowly ovoid, densely villous, including the cylindric-capititate stigma about 1.7 mm long.

SARAWAK, Baram District, Entoyut River, *Hose 407*, August 11, 1894.

Manifestly in the group with *Casearia grewiaefolia* Vent., but with fewer lateral nerves. Above all easily distinguished by its numerous, minute, glandlike teeth.

CASEARIA PUBESCENS sp. nov.

Arbor, ramulis subtus foliis ad costa nervisque floribusque prominente pubescentibus; foliis oblongis, integris, usque ad 20 cm longis, chartaceis, abrupte acuminatis, basi aequilateralibus, rotundatis, breviter petiolatis, nervis utrinque 12, prominentibus; floribus axillaribus, fasciculatis, breviter pedicellatis, 5-meris, staminibus fertilibus 10; ovario pubescente.

A tree, the branchlets, flowers, and the lower surface of the leaves, especially on the midrib and lateral nerves, prominently pubescent with short, spreading, pale-brownish or somewhat tawny, rather soft hairs. Leaves oblong, chartaceous, brownish-olivaceous when dry, dull or slightly shining, 11 to 20 cm long, 5.5 to 8.5 cm wide, the apex rather abruptly acuminate, the acumen 1 to 1.5 cm long, rather blunt, base equilateral, rounded, margins entire, the upper surface glabrous, or somewhat pubescent along the midrib; lateral nerves 12 on each side of the midrib, prominent, curved-ascending, scarcely anastomosing, the reticulations fine; petioles pubescent, stout, about 5 mm long. Fascicles axillary, the bracteoles very numerous, ovate, acute or acuminate, pubescent, about 1 mm long, forming a dense subglobose mass up to 5 mm in diameter, but few flowers developing at one time. Pedicels pubescent, about 1 mm long. Buds subglobose. Sepals 5, elliptic, concave, rounded, densely pubescent, in bud about 2 mm long. Fertile stamens 10. Ovary ovoid, rather densely pubescent with cinereous or pale hairs, the style very short.

SARAWAK, Baram District, Entoyut River, *Hose 454*, November, 1894.

Apparently as closely allied to *Casearia philippinensis* Merr. as any other species; readily distinguished, however, by its leaves not being gradually narrowed upward but abruptly acuminate, rounded, not acute at the base, and its densely pubescent ovary. From *C. lobbiana* Turcz. it is distinguished by its more numerous lateral nerves and pubescent flowers.

CASEARIA LEUCOLEPIS Turcz. in Bull. Soc. Nat. Mosc. 31 (1858) 463.

SARAWAK, Baram District, Baram, *Hose 79*, December, 1894.

This species was originaly described from Singapore, based on *Lobb 468* so localized. In some herbaria, however, Lobb's plant is localized as "Luzon." Lobb collected in Singapore, Java, Borneo, and Luzon, and it is a well-known fact that his specimens were often erroneously localized; see Merrill in Philip. Journ. Sci. 10 (1915) Bot. 184. King [1] does not recognize the species as occurring in the Malay Peninsula, and Stapf [2] gives its range as from Java and Borneo to the Philippines. Koorders,[3] however, does not admit it as Javan. It is probable that Lobb's specimen was from Borneo, not from Luzon, Java, or Singapore. I have seen no Philippine material that I can refer to *Casearia leucolepis* Turcz. Hose's specimen cited above agrees very closely with the fragment of Lobb's plant that I have for comparison, and I believe that they represent the same species.

CASEARIA IMPRESSINERVIA sp. nov.

Arbor, ramulis, subtus foliis ad costa nervisque floribusque griseo- vel cinereo-puberulis vel pubescentibus; foliis oblongis, coriaceis, integris, acute acuminatis, basi acutis, usque ad 8 cm longis, nervis utrinque circiter 8, curvato-adscendentibus, prominentibus, supra impressis; floribus 5-meris, axillaribus fasciculatis, breviter pedicellatis, sepalis 3.5 mm longis, obtusis; staminibus fertilibus 10, staminoideis anguste oblongis, sursum dense villosis; ovario glabro vel supra leviter ciliato.

A tree, size not indicated, the branches and branchlets nearly black when dry, the former glabrous, the latter somewhat pubescent or puberulent, somewhat angled, the internodes about 1 cm long. Leaves coriaceous, oblong, entire, 6 to 8 cm long, 2 to 3 cm wide, sharply acuminate, base acute, equilateral or nearly so, the upper surface quite glabrous, dark-brown and shining when dry, the lower somewhat paler, pubescent with short, rather pale, spreading hairs along the midrib and lateral nerves; lateral nerves 8 on each side of the midrib, curved-ascending, prominent, distinctly impressed on the upper surface, obscurely anastomosing, the reticulations very slender; petioles 7 to 10 mm long, somewhat pubescent. Flowers rather numerous, in axillary fascicles, their pedicels slightly pubescent, about 2 mm long. Sepals 5, oblong, obtuse, somewhat pubescent, about 3.5 mm long. Stamens 10, the longer about 2 mm in length, the alternating five slightly shorter; staminodes narrowly oblong, densely villous above, nearly glabrous below, about 1.2 mm long. Ovary narrowly ovoid, glabrous, or the upper part and lower

[1] Journ. As. Soc. Beng. 67[2] (1898) 14–18.
[2] Trans. Linn. Soc. Bot. 4[2] (1894) 164.
[3] Exkurs. Fl. Java. 2 (1912) 635.

portion of the style sparingly ciliate, including the short style about 2.5 mm long.

SARAWAK, *Native collector 1731* (Bur. Sci.).

Similar to *Casearia hosei* Merr., but with much smaller, sharply acuminate leaves with fewer nerves, which are impressed on the upper surface. In the Bornean species *Casearia laurina* Bl., and *C. capitellata* Bl. the leaves are obtusely acuminate, and they differ in various other characters.

FLACOURTIA L. Héritier

FLACOURTIA RUKAM Zoll. & Mor. Syst. Verzeich. (1854) 33.

SARAWAK, Retuh, Sadong, *Native collector 2527* (Bur. Sci.).

This species, not previously definitely credited to Borneo, extends from Burma and the Malay Peninsula to the Philippines, through the Malay Archipelago to Samoa (*Vaupel 219*). The Bornean specimen has the midrib rather densely pubescent, and some of the leaves present as many as nine pairs of lateral nerves, but it is manifestly referable to this species.

HOMALIUM Jacquin

HOMALIUM MOULTONII sp. nov. § *Myriantheia, Eumyriantheia.*

Arbor inflorescentiis exceptis glabra; foliis oblongo-ovatis ad oblongo-ellipticis, coriaceis, nitidis, integris, vel obscure denticulatis, acuminatis, basi subrotundatis ad acutis, usque ad 10 cm longis, nervis utrinque circiter 8; inflorescentiis racemosis, racemis elongatis, puberulis; floribus 10-meris, circiter 5 mm diametro sepalis petalisque linearibus; staminibus 20, glandulis magnis, dense tomentosis.

A tree, glabrous except the inflorescence. Branches and branchlets, rather slender, terete, reddish-brown, glabrous. Leaves olivaceous when dry, shining, coriaceous, oblong-ovate to oblong-elliptic, 7 to 10 cm long, 3 to 5.5 cm wide, entire or obscurely and distantly denticulate, apex distinctly acuminate, acumen blunt, base acute to somewhat rounded; lateral nerves about 8 on each side of the midrib, slender, distinct, curved, anastomosing, the reticulations distinct; petioles about 5 mm long, pruinose. Racemes axillary, solitary, slender, cinereous-puberulent, up to 18 cm in length. Flowers 10-merous, the narrowly funnel-shaped tube cinereous-pubescent, merging with the short pedicel; the flower, including the tube and pedicel, about 5 mm long, 5 mm in diameter. Sepals 10, linear, pubescent, in anthesis about 2 mm long. Petals similar to the sepals, slightly wider below, some of them eventually nearly 3 mm in length. Stamens 20, their filaments about 1 mm long, intermingled with the large, densely tomentose glands, which completely fill the throat of the perianth; styles 3 or 4, short, glabrous.

SARAWAK, near the foot of Mount Santubong, *Native collector 2376* (Bur. Sci.), February–June, 1914.

A very characteristic species, the third of the genus to be reported from Borneo; well characterized by its elongated, axillary, puberulent or pubescent racemes; its 10-merous, rather small flowers; its linear sepals and petals; and its large, densely tomentose glands, that completely fill the throat of the perianth-tube. Dedicated to Mr. J. C. Moulton, director of the Sarawak Museum.

HOMALIUM HOSEI sp. nov. § *Myriantheia, Eumyriantheia.*

Arbor, inflorescentiis parce pubescentibus exceptis glabra; foliis coriaceis, integris vel leviter crenulatis, ovatis ad oblongo-ovatis, nitidis, usque ad 16 cm longis, obtuse acuminatis, basi rotundatis ad subacutis, in siccitate supra subolivaceis, subtus castaneis vel brunneis, nervis utrinque circiter 7; racemis axillaribus, solitariis, ad 9 cm longis; floribus 5-meris, cum pedicellis circiter 8 mm longis, calycis anguste infundibuliformibus, sepalis 5, coriaceis, anguste ovatis, obtusis, petalis dense pallide pubescentibus, oblongo-ovatis, obtusis; staminibus 15, filamentis glabris, 2 ad 2.5 mm longis.

A tree, glabrous except the inflorescence. Branches and branchlets grayish or brownish. Leaves thickly coriaceous, ovate to oblong-ovate, 7 to 16 cm long, 4 to 7 cm wide, entire or somewhat crenulate or crenate, apex distinctly acuminate, the acumen blunt, base rounded to subacute, when dry shining, the upper surface subolivaceous, the lower castaneous or brown; lateral nerves about 7 on each side of the midrib, prominent, curved, anastomosing, the reticulations distinct; petioles 2 to 3 mm long. Racemes axillary, solitary, sparingly pubescent, 7 to 8 cm long. Flowers mostly in groups of twos or threes, spreading or reflexed, including the short pedicels about 8 mm long, the pedicels and calyx very slightly pubescent. Calyx-tube brown when dry, slightly sulcate, narrowly funnel-shaped. Sepals 5, coriaceous, brown when dry, nearly glabrous, oblong-ovate, narrowed upward, obtuse, 2.3 to 3 mm long. Petals about as long as the sepals, densely pale-pubescent, oblong-ovate, obtuse. Stamens in groups of threes opposite each petal, their filaments glabrous, 2 to 2.5 mm long. Styles 4, appressed-hirsute, 2.5 to 3 mm long.

SARAWAK, Baram District, Baram, *Hose 409* (type), December, 1894.

Here I also refer *Hose 128, 270,* from the same locality, and *Native collector 1377, 1943* (Bur. Sci.), these four specimens presenting only very immature flowers. The species is readily distinguished by its floral characters.

OSMELIA Thwaites

OSMELIA BORNEENSIS sp. nov.

Arbor dioica partibus junioribus inflorescentiisque exceptis glabra; foliis oblongis, usque ad 17 cm longis, in siccitate brun-

neis, chartaceis, integris vel obscure crenulatis, prominente acuminatis, basi acutis, nervis utrinque 5 ad 8, prominentibus; inflorescentiis racemosis, ♂ et ♀ quam foliis multo longioribus; floribus numerosis, 4-meris, sepalis glabris; fructibus circiter 1 cm longis, dense tomentosis.

A dioecious tree, glabrous except the young branchlets, very young leaves, and inflorescences. Branches slender, terete, usually pale-gray, the young branchlets minutely appressed cinereous-puberulent. Leaves oblong, entire or very obscurely crenulate, brown and slightly shining when dry, 8 to 17 cm long, 3 to 6.5 cm wide, base acute, apex rather slenderly and prominently acuminate, the acumen 1 to 1.5 cm long, usually apiculate, both surfaces quite glabrous or the midrib and lateral nerves beneath minutely and obscurely puberulent; lateral nerves 5 to 8 on each side of the midrib, prominent, curved, anastomosing, the reticulations very slender; petioles usually about 1 cm long; stipules linear-acicular, 3 to 4 mm long. Staminate and pistillate racemes in the uppermost axil, sometimes in lower axils, usually simple, rarely with a single elongated branch from the lower part, up to 30 cm in length, both much exceeding the leaves in anthesis, appressed-pubescent with pale hairs. Flowers numerous, few in the axil of each bract, the pedicels about 1 mm long, pubescent, the acuminate bracts about as long as the pedicels. Flowers all 4-merous. Sepals broadly ovate to elliptic ovate, membranaceous, glabrous, rounded, of the staminate flowers 2.5 to 3 mm long, of the pistillate ones about 2 mm long. Scales densely pale-pubescent, about 1.5 mm long. Rudimentary ovary of the staminate flowers oblong, densely pubescent, shortly stipitate, about 2 mm long; filaments slightly pubescent below, about 3 mm long, those of the pistillate flowers about 1 mm in length. Ovary globose, densely pubescent, tipped by three short glabrous styles. Fruit about 1 cm long, oblong, usually somewhat inequilateral, with three rounded angles, densely pale-tomentose. Seeds ellipsoid, about 5 mm long.

SARAWAK, Baram District, Marudi, *Hose 323* (type); Lembang, *Hose 747;* various localities in the vicinity of Kuching, *Native collector 642, 643, 1143, 1144, 1145, 1152, 1168, 1826, 1908* (Bur. Sci.).

This small genus has previously not been reported from Borneo, the known species being *Osmelia paniculata* Warb. (*O. gardneri* Thw.) of Ceylon, *O. maingayi* King of the Malay Peninsula, *O. celebica* Koord. of Celebes and Mindanao, and three Philippine species, *O. conferta* Benth., *O. philippinensis* Benth., and *O. subrotundifolia* Elm. The species above described appears to be most closely allied to *Osmelia maingayi* King, from which it differs in its usually simple, elongated racemes, its glabrous leaves, and its entirely glabrous sepals.

RYPAROSA Blume

RYPAROSA ACUMINATA sp. nov.

Arbor, ramulis adpresse hirsutis, inflorescentiis ♂ elongatis, dense adpresse ferrugineo-hirsutis; foliis oblongis, subcoriaceis, tenuiter acute acuminatis, usque ad 22 cm longis, basi acutis, subtus pallidis, nervis utrinque 3 vel 4, curvato-adscendentibus, prominentibus; racemis ♂ axillaribus, solitariis, usque ad 30 cm longis, floribus numerosis, breviter pedicellatis, sepalis petalisque circiter 3 mm longis.

A tree, the branchlets and the leaves on the midrib and lateral nerves on the lower surface appressed-hirsute, the staminate racemes densely ferruginous appressed-hirsute. Leaves oblong, subcoriaceous, 12 to 22 cm long, 3.5 to 7 cm wide, the upper surface pale-olivaceous, smooth, shining, the lower pale, subglaucous, the base acute, the apex slenderly and acutely acuminate, the acumen 1 to 2 cm in length; lateral nerves 3 or 4 on each side of the midrib, prominent, curved-ascending, the reticulations distinct; petioles 1 to 1.5 cm long. Male racemes axillary, solitary, 15 to 30 cm long, apparently floriferous throughout, but the lower flowers caducous. Pedicels pubescent, about 1.5 mm long. Sepals three, elliptic-ovate to elliptic, 2.5 to 3 mm long, appressed ferruginous-hirsute. Petals 5, membranaceous, oblong-ovate, acute or somewhat acuminate, somewhat pubescent, the basal scale densely ciliate, about 1 mm in diameter. Staminal column glabrous, 2.5 to 3 mm long, slender, somewhat thickened upward; anthers five, 1 mm long, forming a depressed-globose head.

SARAWAK, Baram District, Miri River, *Hose 501*, January, 1905.

The second species of the genus to be reported from Borneo, readily distinguished from the other described forms by its slenderly and sharply acuminate, few-nerved leaves. *Hose 430* possibly represents *Ryparosa longipedunculata* Boerl., a Javan species, but the flowers are quite too young to warrant a definite determination of it.

VIOLACEAE

RINOREA Aublet

RINOREA ANGUIFERA (Lour.) O. Ktze. var. **NERVOSA** (Capit.).

Alsodeia echinocarpa Korth. var. *nervosa* Capit. in Bull. Soc. Bot. France **57** (1910) 394.

SARAWAK, *Native collector 438, 878, 1370* (Bur. Sci.); Samatan, *Foxworthy 168*, May 2, 1908.

The above specimens are apparently referable to Capitaine's variety, which is here transferred to *Rinorea anguifera*. *Medusa anguifera* Lour., Fl. Cochinch. (1790) 406, supplies the oldest specific name for the species.

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THE AMBOINA PTERIDOPHYTA COLLECTED BY C. B. ROBINSON [1]

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The present paper consists of an enumeration of the *Pteridophyta* collected by the late Dr. C. B. Robinson in Amboina. The object of his field work there was to collect a series of specimens that should represent the forms actually described by Rumphius in the Herbarium Amboinense, so far as such material can definitely be connected with the Rumphian descriptions.

The definite or suggested identifications with the Rumphian species cited in this paper, are for the most part those made by Doctor Robinson during the prosecution of his field work in Amboina, July 15, 1913, the date of his arrival there, to December 5, 1913, the date of his untimely death. The entire collection was divided into two series: First, those that can definitely or fairly definitely be referred to species figured and described, or merely described, by Rumphius; and, second, those that were apparently unknown to Rumphius, or at least that were not described or figured by him. The former are to be distributed with special labels, *Plantae Rhumphianae Amboinenses,* with

[1] The present paper is the first publication to be issued on the results of the field work of the late Dr. C. B. Robinson in Amboina. Work on the remainder of the collection is being prosecuted as rapidly as possible and it is hoped that the whole can be prepared and issued at no distant date. The complete publication, as being prepared, will consist of a critical consideration of the Rumphian species so far as their status can be determined, worked out not from a study of literature alone like the interpretations of Burmann, Stickman, Linnaeus, Henschel, and, to a large degree, Hasskarl, but from a study of the literature supplemented by the fairly comprehensive Amboina collections now available through the active field work of Doctor Robinson.

In view of the special plan on which this proposed work is being prepared, it has been considered best to publish the present paper without delay and in its present form. [E. D. M.]

both the modern and the Rumphian names, the latter in a second series, *Reliquiae Robinsonianae.*

Appended to this paper is a complete list of the *Pteridophyta* described by Rumphius with their modern equivalents so far as these have definitely been determined.

HYMENOPHYLLACEAE

TRICHOMANES Linnaeus

TRICHOMANES CUPRESSOIDES Desv. Prodr. (1827) 330; v. A. v. R. Mal. Ferns 103.

AMBOINA, Heotoemoeri road, *Rel. Robins. 2388*, September 30, 1913; Hitoe messen, *Rel. Robins. 2478*, October 18, 1913, altitude about 300 meters.

Distrib.: Tropical Asia, Madagascar, Mascarenes, Comores, Seychelles.

TRICHOMANES DIFFUSUM Bl. Enum. Pl. Jav. (1828) 225; v. A. v. R. Mal. Ferns 90.

AMBOINA, Lateri, *Rel. Robins. 1940*, September 9, 1913, on trees, altitude 300 meters.

Distrib.: Java, Amboina.

TRICHOMANES HUMILE Forst. Prodr. (1786) 84; v. A. v. R. Mal. Ferns 94.

AMBOINA, Soja, *Rel. Robins. 1944, 1976*, August, 1913, on rocks, altitude 400 meters.

Distrib.: Malaya to Formosa, Polynesia, Australia, New Zealand.

TRICHOMANES JAVANICUM Bl. Enum. Pl. Jav. (1828) 224; v. A. v. R. Mal. Ferns. 799.

AMBOINA, Soja, *Rel. Robins. 1964*, August 31, 1913, on rocks, altitude about 375 meters.

Distrib.: Tropical Asia, Malaya, Polynesia, and Australia.

TRICHOMANES MEIFOLIUM Bory in Willd. Sp. Pl. 5 (1870) 509; v. A. v. R. Mal. Ferns 105.

Var. **ALATUM** v. A. v. R. l. c.

AMBOINA, Salahoetoe, *Rel. Robins. 1966*, November 27, 1913, terrestrial, altitude about 800 meters.

Distrib.: Malaya to Polynesia.

TRICHOMANES PALLIDUM Bl. Enum. Pl. Jav. (1828) 225; v. A. v. R. Mal. Ferns 93 (exclud. *Craspedoneuron album* v. d. B.).

AMBOINA, Salahoetoe, *Rel. Robins. 2589*, November 27, 1913, on trees, altitude about 750 meters.

Distrib.: Tropical Asia to Polynesia.

TRICHOMANES MINUTISSIMUM v. A. v. R. sp. nov. Plate V, fig. 1.

Hemiphlebium.—Rhizoma filiforme, decidue et obscure tomentosum. Stipites seriati, 0–2 mm longi, cum parte inferiore

costae decidue et obscure tomentosi. Frondes tenues, 4-5 mm longae, 1-4 mm latae, costatae, apice rotundatae vel rotundato-truncatae, venis pinnatim dispositis, in frondibus latissimis simulate flabellatis, in frondibus angustissimis erecto-patentibus, venulis spuriis paucis venis parallelibus; frondes steriles rotundato-oblongae, late ovatae vel cuneato-obovatae, integerrimae vel subintegerrimae, apice nunc integrae nunc emarginatae ad 2-lobatae, costa apicem versus sensim evanescente; frondes fertiles cuneato-obovate vel lineari-cuneatae, apice emarginatae ad 2-fidae, costa in sinu terminante. Sori ad costam terminales et solitarii, exserti, sessiles vel breviter pedunculati; indusium infundibuliforme, limbo dilatato, 2-valvi, valvis patentibus, semiorbicularibus; receptaculum exsertum, fragile.

AMBOINA, Soja, *Rel. Robins. 1944 p. p.*, August 2, 1913, on rhizomes of *Trichomanes humile* Forst.

TRICHOMANES PERVENULOSUM v. A. v. R. sp. nov. Plate V, fig. 2.

Gonocormus.—Rhizoma repens, filiforme, copiose ramosum, probabiliter caespitosum, ferrugineo-tomentosum, demum saepe glabrum. Stipites sparsi, filiformes, 0.5 ad 5 mm longi. Frondes tenuissimae, glabrae, simplices vel saepius 2-3-fidae, basi cuneatae ad anguste longe decurrentes, segmentis primariis erectis, erecto-patentibus vel patentibus, simplicibus vel furcatis vel raro irregulariter furcato-flabellatis; fronde simplices lineares, 5 ad 15 mm longae, 1.5 ad 2 mm latae, costatae, integerrimae, apice rotundate et interdum emarginatae; frondes divisae, 5 ad 20 mm longae, 3 ad 20 mm latae, segmentis ultimis brevissimis vel usque ad 15 mm longis, parte superiore frondium simplicium similibus; venae desunt; venulae spuriae adsunt, copiosae, breves, rectae vel leviter curvatae flexuosaeque, erecto-patentes vel costae marginive parallelae. Sori 1 vel plures, ad frondem simplicem vel ad segmenta frondium divisarum solitarii terminalesque; indusium infundibuliforme, immersum, limbo dilatato, patenti, vix 2-valvi; receptaculum non vel breviter exsertum.

AMBOINA, Hitoe lama, *Rel. Robins. 1947*, November 6, 1913, on limestone rocks, altitude about 100 meters.

This species resembles in aspect *Trichomanes Aswijkii* Rac., which, however, is larger and without spurious venules.

CYATHEACEAE

ALSOPHILA R. Brown

ALSOPHILA AMBOINENSIS v. A. v. R. sp. nov.

Stipites 50 cm superantes, in sicco ± fusci, gibbis brevibus, conicis, acutis aculeati, decidue ferrugineo-furfuracei. Frondes

3-pinnatifidae, rachide primaria in parte inferiore aculeolata, cum rachidibus secundariis supra pubescenti, juvenili subtus probabiliter furfuraceo-tomentosa et squamulosa; pili (partis ventralis) breves, patentes, incurvati, rufi vel castanei; tomentum (partis dorsalis) ochraceum; squamulae anguste subulatae vel filiformes, fuscae. Pinnae patentes, breviter petiolatae, acuminatae, rachide apicem versus anguste alata; pinnae maximae ovato-lanceolatae, usque ad ± 50 cm longae et 17.5 cm latae; pinnae inferiores valde remotae, reductae. Pinnulae firmiter herbaceae vel subcoriaceae, glabrae, usque ad 20–25 utrinque, breviter petiolulatae, obliquae vel inferiores patentes vel horizontales, profunde pinnatifidae, basi cuneato-truncatae, apice longe acuminato, subcaudato, grossius serrato-dentatae, costa supra fusco-puberula, cum costulis subtus squamulis minutis, ovatis, bullatis, acuminatis, pallidis (squamulis minus bullatis intermixtis) munita; pinnulae maximae ± 9 cm longae et 1.5 cm latae. Segmenta conferta vel approximata, patentia vel subhorizontalia, lineari-oblonga, recta vel subfalcata, usque ad 1 cm longa et 3 mm lata, parte inferiore crenata vel crenulata, apicem obtusiusculum vel acutiusculum versus serrato-dentata, venis usque ad 8-10 utrinque, furcatis, superioribus simplicibus. Sori subcostulares, venas inferiores occupantes, usque ad ± 6 utrinque, demum confluentes; capsulae pilis hyalinis, articulatis (capsulas non conspicue superantibus) intermixtae.

AMBOINA, Hatiwe, *Robinson Pl. Rumph. Amb. 464*, September 15, 1913, in forests, altitude 300 meters; Soja, *Robinson Pl. Rumph. Amb. 465*, August 4, 1913, in forests, altitude 400 meters.

Representing: PALMAFILIX NIGRA Rumph. Herb. Amb. VI, 65 (tab. XXVII?).

The esential parts of Doctor Robinson's notes regarding this tree fern are as follows: Trunk 4 to 5 m high, 8 to 10 cm in diameter, somewhat spiny. Fronds tripinate, about 2.5 m long, narrowly elliptic in outline; pinnae about 35 on each side of the rachis. The stipes run down on the trunk, which has a tendency to branch.

ALSOPHILA RUMPHIANA v. A. v. R. sp. nov.

Frondes 3-pinnatifidae, rachide in sicco subfusca, gibbis minutis, oblongis, apice atro-brunneis scabra, subtus decidue furfuraceo-tomentosa, supra hispida et paleacea; tomentum pallide ochraceum; pili longiusculi, pallide ochracei, longitudinaliter subappressi, setis articulatis, patentibus, basi rufis (sursum interdum applanatis, non-articulatis, pallide flavidis, breviter ciliolatis) intermixti; paleae longae, anguste subulato-lanceolatae, pallide flavidae, pilis brevibus, suberectis, acutis, rufis ciliolatae. Pinnae breviter petiolatae, ± 50 cm longae, acuminatae, rachide

(cum costis) laevi vel sublaevi, subtus decidue pallide furfuracea, supra pilis proportione longis, subappressis copiose vestita. Pinnulae herbaceae, glabrae, confertae vel approximatae, sessiles, horizontales vel subhorizontales, profunde pinnati-partitae, acuminatae, acumine obtusiusculo, apicem versus serrato vel crenato, deorsum grosse dentato; pinnulae centrales maximae, ca. 11 cm longae et basi truncata ca. 2.5 cm latae. Segmenta approximata, subhorizontalia, lineari-oblonga, usque ad 1.25 cm longa et 3 mm lata, obtusa vel obtusiuscula, crenata, basi dilatata; crenae simplices, retusae vel 2-3-crenulatae, certe inferiores ciliatae, ciliis patentibus, articulatis, ad apicem venularum solitariis; segmenta infima non raro libera, horizontalia et basi non dilatata; segmenta fertilia supra ad locos receptaculorum non profunde sed distincte impressa; costulae et venae supra pilis setiformibus sparsis, acutis, pallide flavidis munitae; costulae subtus squamulosae, squamulis minutis, ovatis, bullatis, acuminatis, acumine graciliter fimbriato; venae usque ad 12-15 utrinque, subtus leviter prominentes, furcatae ad duplicato-furcatae, superiores simplices. Sori ad venas inferiores, usque ad 8 utrinque, subcostulares; capsulae pilis breviusculis (capsulas non vel vix superantibus), articulatis, fuscis intermixtae.

AMBOINA, Hitoe messen, *Robinson Pl. Rumph. Amb. 463*, October 14, 1913, in light forest, altitude 175 meters.

Representing: PALMAFILIX ALBA Rumph. Herb. Amb. VI, 63.

Doctor Robinson's notes on this plant are as follows: Twelve meters high, trunk 14 cm in diameter, the basal part densely covered with purple-black fibrils, this fibrous portion about three-fifths of the whole diameter of the trunk at the base, but the fibers mostly absent above. Fronds about twenty-five, 3 m long, the stipe about 5.5 cm. wide at the base, up to 1 m to the first pinnae, the pinnae about fifteen on each side, alternate, the lower three to eight about equal in length and longer than those above.

POLYPODIACEAE

DRYOPTERIS Adanson

DRYOPTERIS DIDYMOSORA (Parish) C. Chr. Ind. Fil. (1906) 262; v. A. v. R. Mal. Ferns 225.

D. parasitica O. Ktze., conf. C. Chr. in Ark. för Bot. 9 [11]: 26, *fig. 4*.
Nephrodium didymosorum Parish ex Bedd. Ferns Brit. Ind. (1866) *t. 200*.

AMBOINA, *Rel. Robins. 1959*, July 23, 1913, riverside, town of Amboina, locally known as *paku bau busuk*.

Robinson's specimen agrees almost exactly with Beddome's plate mentioned above. The sori, however, are apparently smaller, and the contiguous pairs placed so closely, that each pair of sori seems to be a single sorus only. New to Amboina.

Distrib.: Northern India, southern China, and the Malay Peninsula (?).

DRYOPTERIS FEROX (Bl.) O. Ktze. Rev. Gen. Pl. 2 (1891) 812; v. A. v. R. Mal. Ferns 221.

Aspidium ferox Bl. Enum. Pl. Jav. (1828) 153.

AMBOINA, near the town of Amboina, *Robinson Pl. Rumph. Amb. 439*, July 23, 1913, river banks, altitude about 10 meters, "pinnae 25 to 40 on each side of the rachis."

Representing: FILIX AMBOINICA MAS (*sive* AGRESTIS) Rumph. Herb. Amboin. VI, 69.

Distrib.: Malaya.

DRYOPTERIS INTERMEDIA (Bl.) O. Ktze. Rev. Gen. Pl. 2 (1891) 813; v. A. v. R. Mal. Ferns 199;

Dryopteries rhodolepis C. Chr. Ind. Fil. (1906) 288 p. p.
Aspidium intermedium Bl. Enum. Pl. Jav. (1828) 161.

AMBOINA, Hitoe messen, *Rel. Robins. 1956*, altitude about 450 meters. Somewhat larger than usual, and the lowest pinnae broader, much produced on the lower side.

Distrib.: Malaya.

DRYOPTERIS PSEUDO-ARBUSCULA v. A. v. R. sp. nov.

Nephrodium.—Rhizoma breviter trunciforme, apice squamis longis, subulatis, integerrimis, pallide fuscis vestitum. Stipites conferti, infra pinnas reductas 2.5 ad 3.5 cm longi, breviter hispidi. Frondes lanceolatae, 20 ad 25 cm longae, ad mediam 5 ad 6 cm latae, acuminatae, rachide pilis longis, acutis, pallidis dense hispida. Pinnae herbaceae, utrinque breviter puberulae, ad costas venasque subtus hispidae; pinna terminalis triangularis, apice subcaudata et subintegerrima, basi profunde pinnatifida; pinnae laterales remotae, ca. 18 utrinque, horizontales vel patentes, lineares, obtusae, costulis (main veins) obliquis, superioribus simplicibus, ceteris pinnatis, venis 1-3 utrinque, venis infimis anastomosantibus; pinnae superiores adnatae, ceterae subpetiolulatae; pinnae maximae 3 cm longae, basi truncata vel subtruncata el paullo dilatata (sub-1-2-auriculata) usque ad 7 mm latae, margine costam versus usque ad $\frac{1}{3}$ lobatae; pinnae ceterae minus incisae vel subintegerrimae; pinnae inferiores sensim vel abrupte reductae, infimae minute auriculiformes. Lobi obtusi, integerrimi vel parce repando-crenati. Sori ad venas mediales, majusculi; indusium persistens, copiose hispido-ciliatum.

AMBOINA, Batoe merah, *Rel. Robins. 1962*, August 24, 1913, terrestial in bed of a ravine, altitude about 20 meters; the rhizome horizontal, often exposed from 10 to 20 cm.

Differs from *Dryopteris arbuscula* O. Ktze. in having the pinnae blunter, hispid on the veins beneath, the veins less numerous, less copiously anastomosing, and the indusia ciliate.

CYCLOPELTIS J. Smith

CYCLOPELTIS PRESLIANA (J. Sm.) Berk. Introd. Crypt. Bot. (1857) 517; v. A. v. R. Mal. Ferns 164.

Lastraea presliana J. Sm. in Hook. Journ. Bot. 3 (1841) 412.

AMBOINA, Ayer putri, *Rel. Robins. 1960*, July 29, 1913, on coral rocks at low altitudes.

Distrib.: Burma, through Malaya and the Philippines to New Guinea.

ASPIDIUM Swartz

ASPIDIUM REPANDUM Willd. Sp. Pl. 5 (1810) 216; v. A. v. R. Mal. Ferns 236.

Aspidium pachyphyllum Ktze. in Bot. Zeit. (1848) 259; v. A. v. R. l. c. 252.

Aspidium persoriferum Copel. in Perk. Fragm. Fl. Philip. (1905) 177; v. A. v. R. l. c. 251.

Tectaria crenata Cav.; Copel. in Philip. Journ. Sci. 2 (1907) Bot. 414.

AMBOINA, Soja, *Robinson Pl. Rumph. Amb. 447*, August 2, 1913, altitude about 250 meters.

Representing: LOCHITIS AMBOINICA RECTA MINOR (NIGRA) Rumph. Herb. Amboin. VI, 71.

Distrib.: Malaya and the Philippines to Polynesia.

STENOSEMIA Presl

STENOSEMIA AURITA (Sw.) Pr. Tent. Pterid. (1836) 237, *t. 10, f. 24*; v. A. v. R. Mal. Ferns 726.

Acrostichum auritum Sw. in Schrad. Journ. 1800[2] (1801) 12.

AMBOINA, Way Uri and Halong, *Robinson Pl. Rumph. Amb. 444*, September, 1913, altitude 25 to 50 meters.

Representing: FILIX FLORIDA Rumph. Herb. Amboin. VI, 78, tab. XXXV, fig. 1.

Distrib.: Malaya, Solomon Islands.

DIPTERIS Reinwardt

DIPTERIS CONJUGATA Reinw. Syll. Plant. Nov. 2 (1824) 3; v. A. v. R. Mal. Ferns 523.

AMBOINA, Salahoetoe, *Rel. Robins. 1974*, November 27, 1913, very common, altitude 200 to 800 meters.

Distrib.: Tropical Asia to Polynesia.

DIPTERIS LOBBIANA (Hook.) Moore, Ind. Fil. (1857) LXXX; v. A. v. R. Mal. Ferns 522.

Polypodium lobbianum Hook. Journ. Bot. 5 (1853) 309, *t. 11*.

AMBOINA, Salahoetoe, *Rel. Robins. 1970*, November 27, 1915, on rocks along a small stream, altitude about 750 meters.

Distrib.: Malaya.

NEPHROLEPIS Schott

NEPHROLEPIS HIRSUTULA (Forst.) Pr. Tent. Pterid. (1836) 79; v. A. v. R. Mal. Ferns 160.

Polypodium hirsutulum Forst. Prodr. (1786) 81.
Aspidium hirsutulum Sw.; Schk. Krypt. Gew. 1 (1804) *t. 33.*

AMBOINA, Binting, *Rel. Robinson 1957*, July 29, 1913, on grassy slopes at low altitudes.

Distrib.: Pantropical.

HUMATA Cavanilles

HUMATA SUBTILIS v. A. v. R. in Bull. Jard. Bot. Buitenz. 7 (1912) 18.

Humata perpusilla v. A. v. R. l. c. 17.

AMBOINA, Salahoetoe, *Rel. Robins. 1968*, November 27, 1913, on logs, altitude about 650 meters.

Humata perpusilla is a juvenile form of *H. subtilis;* consequently both forms may be found on the same rhizome.

Distrib.: New Guinea, Amboina, Taliabo.

HUMATA GAIMARDIANA (Gaudich.) J. Sm. in Hook. Journ. Bot. 1 (1842) 425.

Nephrodium gaimardianum Gaudich. Bot. Freyc. Voy. (1827) 335, *t. 12, f, 1.*

AMBOINA, Wakal, *Rel. Robins. 1939*, November 5, 1913, on *Sonneratia* trees along the seashore.

Distrib.: Burma to Malaya and Polynesia.

DAVALLIA Smith

DAVALLIA ELATA (Forst.) Spr. in Schrad. Journ. 1799 [2] (1799) 271; Hook. Sp. Fil. 1 (1846) *t. 55;* v. A. v. R. Mal. Ferns 302.

Davallia denticulata Mett. (var.) C. Chr. Ind. Fil. (1906) 209.
Trichomanes elatum Forst. Prodr. (1786) 85.

AMBOINA, Ayer putri, *Robinson Pl. Rumph. Amb. 449*, July 28, 1913, epiphytic at low altitudes.

Representing: DRYOPTERIS ARBOREA Rumph. Herb. Amboin. VI, 73, tab. XXXII, fig. 1.

Robinson's specimen differs from Hooker's plate in having the adnate basal portion of the indusium subsemiorbicular, the free apical portion triangular with rather straight edges, and the spurious veins less numerous and less distinct.

Distrib.: Burma to Malaya and Polynesia.

TAPEINIDIUM C. Christensen

TAPEINIDIUM AMBOYNENSE (Hook.) C. Chr. Ind. Fil. (1906) 631; v. A. v. R. Mal. Ferns 315.

Davallia amboinensis Hook. Sp. Fil. 1 (1846) 178, *t. LVI C.*

AMBOINA, Lateri, *Robinson Pl. Rumph. Amb. 443*, September 9, 1913, in forests, altitude about 250 meters.

Representing: DRYOPTERIS SILVESTRIS TERRESTRIS Rumph. Herb. Amb. VI, 73 (?).

Distrib.: Moluccas, Samoa.

LINDSAYA Dryander

LINDSAYA CULTRATA (Willd.) Sw. Syn. Fil. (1806) 119; v. A. v. R. Mal. Ferns 269.

Adiantum cultratum Willd. Phytograph. (1794) 14, *t. 10, f. 2.*

AMBOINA, Hitoe messen, *Rel. Robins. 1951*, October 18, 1913, altitude about 350 meters; Hoetoemoeri road, *Rel. Robins. 1948*, September 30, 1913, on banks, altitude, about 200 meters; a small, young form.

Distrib.: Madasgascar, Réunion, tropical Asia to Queensland.

LINDSAYA DAVALLIOIDES Bl. Enum. Pl. Jav. (1828) 218; v. A. v. R. Mal. Ferns 274.

AMBOINA, Hitoe messen, *Rel. Robins. 1937*, October 18, 1913, altitude 350 meters.

ASPLENIUM Linnaeus

ASPLENIUM NIDUS L. Sp. Pl. (1763) 1079; v. A. v. R. Mal. Ferns 439.

AMBOINA, Ayer putri, *Robinson Pl. Rumph. Amb. 448*, July 28, 1913, epiphytic at low altitudes.

Representing: PHYLLITIS AMBOINICA ARBOREA Rumph. Herb. Amboin. VI, 82, t. XXXVII, fig. 1.

Distrib.: Paleotropical.

ASPLENIUM AMBOINENSE Willd. Sp. Pl. 5 (1810) 303; v. A. v. R. Mal. Ferns 441.

AMBOINA, Hitoe lama, *Rel. Robins. 1946*, October 11, 1913, on small trees, altitude about 150 meters.

Distrib.: Malaya, Polynesia.

ASPLENIUM BELANGERI (Bory) Kze. in Bot. Zeit. (1848) 176; v. A. v. R. Mal. Ferns 474.

Darea belangeri Bory in Belang. Voy. Bot. 2 (1833) 51.
Asplenium tenerum Forst. (var.) C. Chr. Ind. Fil. (1906) 134.

AMBOINA, Hatiwe, *Rel. Robins. 1942*, September 15, 1913, on rocks along streams, altitude about 250 meters.

Distrib.: British India across Malaya and the Philippines to Polynesia.

ASPLENIUM TENERUM Forst. Prodr. (1786) 80; v. A. v. R. Mal. Ferns 458.

AMBOINA, Soja, *Rel. Robins. 1931*, August 31, 1913, on rocks, altitude about 300 meters.

Distrib.: Seychelles, British India, across Ceylon and Malaya to the Philippines and Polynesia.

ASPLENIUM LASERPITIIFOLIUM Lam. Encycl. 2 (1786) 310; v. A. v. R. Mal. Ferns 472.

AMBOINA, Hoenoet, *Rel. Robins. 1938*, October 18, 1913, on trees, altitude about 200 meters.

Distrib.: Malaya, Polynesia, and tropical Australia.

ASPLENIUM sp.

AMBOINA, Hitoe lama, *Rel. Robins. 1963*, October 8, 1913, altitude 220 meters. A young and sterile specimen near *A. cuneatum* Lam., or a form of it.

ADIANTUM Linnaeus

ADIANTUM ROBINSONII v. A. v. R. sp. nov.

Eu-adiantum.—Rhizoma breve, squamulis anguste lineari-subulatis pallide rufo-fuscis vestitum. Stipites approximati, basin versus squamulosi et demum asperuli, ceterum (cum rachidibus) glabri, atro-brunnei, nitentes. Frondes ± 10 ad 15 cm longae, usque ad 12 cm latae, ramosae; rami laterales infra ramum terminalem 1 vel 2 utrinque. Foliola coriacea, supra leviter nitentia, subtus subopaca, approximata, breviter at graciliter petiolulata, dimidiato-oblonga, 1 ad 1.5 cm longa, usque ad 0.75 cm lata, margine superiore et exteriore serrulata (vel leviter 2-lobata et serrulata) et pellucido-striata, venis subflabellatis, in sinibus serraturarum terminantibus. Sori in quoque foliolo 1 vel 2, ad marginem superiorem positi, transverse oblongi vel linearioblongi, sat recti; capsulae ad et inter venulas ortae; indusium angustum, coriaceum, obscure fuscum.

AMBOINA, Amahoesoe, *Rel. Robins. 1941*, September 16, 1913, altitude 80 meters.

CHEILANTHES Swartz

CHEILANTHES TENUIFOLIA (Burm.) Sw. Syn. Fil. (1806) 129, 332; v. A. v. R. Mal. Ferns 339.

Trichomanes tenuifolium Burm. Fl. Ind. (1768) 237.

AMBOINA, Way Tommo, *Robinson Pl. Rumph. Amb. 442*, August 19, 1913, altitude about 80 meters.

Representing: DRYOPTERIS CAMPESTRIS Rumph. Herb. Amboin. VI, 74, t. XXXIV, fig. 2.

Distrib.: Tropical Asia, Australia, and Polynesia, to Tasmania and New Zealand.

PTERIS Linaeus

PTERIS ORIENTALIS v. A. v. R. in Bull. Dépt. Agr. Ind. Néerl. 18 (1908) 12; Mal. Ferns 355.

Var. **GLABRA** v. A. v. R. in Bull. Jard. Bot. Buitenz. 7 (1912) 26.

AMBOINA, Binting, *Rel. Robins. 1958*, July 29, 1913, roadside at low altitudes, locally known as *paku kawat*.

Large; pinnae remote; lower pinnae with the base obliquely cordate, i. e. the upper side of the base shorter and broader than the lower. Perhaps a derived form of *Pteris moluccana* Bl., with the pinnae unequally cuneate at the base.

VITTARIA ZOSTERIFOLIA Willd. Spec. Pl. 5 (1810) 406; v. A. v. R. Mal. Ferns 554.

AMBOINA, Hitoe lama, *Rel. Robins. 1950*, October 8, 1913, epiphytic, at an altitude of about 125 meters.

Distrib.: Mascarenes, Comores, Malaya, to Polynesia.

SCLEROGLOSSUM van Alderwereldt van Rosenburgh

SCLEROGLOSSUM PUSILLUM (Bl.) v. A. v. R. in Bull. Jard. Bot. Buitenz. 7 (1912) 37, *t. 5, fig. 1–2.*

Vittaria pusilla Bl. Enum. Pl. Jav. (1828) 199; v. A. v. R. Mal. Ferns 560.

AMBOINA, Salahoetoe, *Rel. Robins. 1965*, November 27, 1913, epiphytic, altitude about 950 meters.

Distrib.: Ceylon, Malacca, Java, Borneo, Philippines, New Guinea, Queensland.

ANTROPHYUM Kaulfuss

ANTROPHYUM CALLIFOLIUM Bl. Enum. Pl. Jav. (1828) 111; v. A. v. R. Mal. Ferns 535.

AMBOINA, Soja, *Rel. Robins. 1943*, August, 3, 1913, on rocks, altitude about 400 meters.

Distrib.: Malaya, Polynesia.

ANTROPHYUM PLANTAGINEUM (Cav.) Kaulf. Enum. Fil. (1824) 197.

Hemionitis plantaginea Cav. Descr. (1802) 260; v A. v. R. Mal. Ferns 533

AMBOINA, Ayer putri, *Rel. Robins. 1945*, July 28, 1913, on trees and coral limestone at low altitudes.

Distrib.: Northern India, Ceylon, Malaya, and Polynesia.

DRYMOGLOSSUM Presl

DRYMOGLOSSUM FALLAX v. A. v. R. sp. nov. Plate VI.

Rhizoma longe repens, gracile, firmum, ramosum, in sicco obscure fuscum vel nigrescens, squamis ovatis vel lanceolato-subulatis, subrufis, acuminatis, irregulariter denticulatis, basi peltatis ornatum. Stipites remoti, 2-seriati, supra basin articulati, frondium sterilium 2-3, frondium fertilium usque ad 12 mm longi. Frondes steriles coriaceae, pilis stellatis, pallidis, appressis, paucis munitae, late oblongae vel ovatae, integerrimae, apice obtusae vel rotundatae, basi late cuneatae, rotundato-truncatae vel subcordatae, ad stipitem abrupte et anguste cuneato-decurrentes; costa sursum sensim evanescens; areolae subhexagonae, obliquae, venulis liberis, excurrentibus parce munitae. Frondes fertiles lineares, semiteretes, 1.5 ad 4.5 cm longae, 2.5 ad 3 mm latae, subtus profunde et late 2-sulcatae, apice obtusiusculae, marginibus parallelis, basi anguste cuneatae et longe decurrentes. Sori lati, continui, in sulcis positi, costam subapproximati.

AMBOINA, Hitoe messen, *Rel. Robins. 9152*, October 14, 1913, epiphytic in light forests, altitude 175 meters, locally known as *paku tali.*

Very remarkable in having the sori flanked by rows of long-stalked peltate hairs, and the capsules of each sorus separated by a longitudinal series of densely crowded, simple or variously branched, pale paraphyses,

so as to form two parallel series of capsules to a sorus. *Drymoglossum carnosum* J. Sm., reported from Amboina, differs in having the areolae provided with recurrent free veinlets, and the sori covered by peltate scales when young.

HYMENOLEPIS Kaulfuss

HYMENOLEPIS SPICATA (Linn. f.) Presl Epim. (1849) 159; v. A. v. R. Mal. Ferns 728.

Acrostichum spicatum Linn. f. Suppl. (1781) 444.

AMBOINA, Mahiya, *Rel. Robins. 1949*, October 3, 1913, epiphytic, altitude about 350 meters.

Distrib.: Madagascar, Mascarenes, Tropical Asia, Australia, and Polynesia.

POLYPODIUM Linnaeus

POLYPODIUM CONTIGUUM (Forst.) J. Sm. in Hook. Journ. Bot. 3 (1841) 394; v. A. v. R. Mal. Ferns 616.

Trichomanes contiguum Forst. Prodr. (1786) 841.
Davallia contigua Spr. in Schrad. Journ. 1789 [2] (1789) 271.

Var. **MONOSORA** Copel. in Perk. Fragm. (1905) 179.

AMBOINA, Hitoe messen, *Rel. Robins. 1935*, October 18, 1913, on trees with *Polypodium decorum* Brack.

Distrib.: Java, the Philippines, and New Guinea.

POLYPODIUM DECORUM Brack. in Wilkes U. S. Expl. Exp. 16 (1854) 7, *t. 2, fig. 2;* v. A. v. R. Mal. Ferns 608.

AMBOINA, Hitoe messen, *Rel. Robins. 1936*, October 18, 1913, on trees, altitude about 400 meters.

A young specimen with the fronds shorter and narrower than usual.

Distrib.: Ceylon across Malaya to Polynesia.

POLYPODIUM MERRILLII Copel. in Perk. Fragm. Fl. Philip. (1905) 188; v. A. v. R. Mal. Ferns 579.

AMBOINA, Salahoetoe, *Rel. Robins. 9169*, November 27, 1913, on trees, altitude about 950 meters.

Distrib.: Philippines (Palawan only).

PLEOPELTIS Humbolt & Bonpland

PLEOPELTIS MUSIFOLIA (Bl.) Moore Ind. Fil. (1857) LXXVIII.

Polypodium musifolium Bl. Enum. Pl. Java (1828) 134; Fl. Jav. 2:171, *t. 79;* v. A. v. R. Mal. Ferns 654.

Forma *typica:* Fronds linear or ligulate, cordate or rounded at the base, sessile; main veins long, rather straight, reaching nearly to the margin, connected by transverse veins forming several rows of nearly regular, subquadrangular primary areolae.

AMBOINA, Ayer putri, *Rel. Robins. 1954*, July 28, 1913, on trees at low altitudes.

A young form intermediate between the type and the variety by its lanceolate fronds acute at the base, and its irregular lower venation.

Distrib.: Malaya.

Var. **SCHUMANNIANA** (Diels) Ros. in Nov. Guin. 8 (1912) Bot. 729.

Polypodium schumannianum Diels in Schum. & Laut., Fl. Deut. Schutzgeb. Süds. (1889) 139, *t. 3, C-D.*

Fronds smaller, varying from ovate-oblong or panduriform to lanceolate, sessile with a cordate base with overlapping lobes to stalked with a long-decurrent acute base; main veins forming a series of large, costal primary areolae; a second series of stout veins forms smaller areolae outside the costal ones, both including numerous finer ones resembling those between the second series and the margin. United with the type by intermediate forms.

AMBOINA, Lateri, *Rel. Robins. 1961,* August 25, 1913, epiphytic, altitude 175 meters, locally known as *paku karang.*

Distrib.: New Guinea and Amboina.

PLEOPELTIS PHYMATODES (Linn.) Moore Ind. Fil. (1857) LXXVIII.

Polypodium phymatodes Linn. Mant. 2 (1771) 306; v. A. v. R. Mal. Ferns 664.

AMBOINA, Ayer putri, *Robinson Pl. Rumph. Amb. 441,* July 28, 1913, epiphytic at low altitudes.

Representing: POLYPODIUM INDICUM MINUS (*sive* GLABRUM) Rumph. Herb. Amboin. VI, 80, t. XXXV, fig. 2.

Distrib.: Tropical Africa, Asia, Australia, Polynesia, and southern China.

PLEOPELTIS SINUOSA (Wall.) Bedd. Ferns Brit. Ind. (1865) *t. 8.*

Polypodium sinuosum Wall. List (1829) No. 2231; v. A. v. R. Mal. Ferns 623.

AMBOINA, Kati-Kati, *Robinson Pl. Rumph. Amb. 445,* October 17, 1913, on trees in mangrove swamps.

Representing: SCOLOPENDRIA MINOR Rumph. Herb. Amboin. VI, 84 (?).

Distrib.: Malaya, Melanesia.

PLEOPELTIS PUNCTATA (Linn.) Bedd. Ferns Brit. Ind. Suppl. (1876) 22.

Polypodium punctatum Sw. in Schrad. Journ. 1800[2] (1800) 21; v. A. v. R. Mal. Ferns 653.

Acrostichum punctatum Linn. Sp. Pl. ed. 2 (1763) 1524.

AMBOINA, Hoenoet, *Rel. Robins. 1955,* October 18, 1913, on trees, altitude about 200 meters.

Distrib.: Tropical Africa, Asia, Australia, and Polynesia.

PLEOPELTIS IMBRICATA (Karst.) v. A. v. R. in Bull. Dépt. Agr. Ind. Néerl. 17 (1909) 3.

Polypodium imbricatum Karst. in Ann. Jard. Bot. Buitenz. 12 (1895) 168 *tab. 15, fig. 29, 30, tab. 16, fig. 49, tab. 19;* v. A. v. R. Mal. Ferns 624.

Polypodium mirabile C. Chr. Ind. Fil. (1906) 545.

AMBOINA, Salahoetoe, *Rel. Robins. 1953,* November 27, 1913, on trees, altitude about 350 meters.

Known only from Amboina.

CYCLOPHORUS Desvaux

CYCLOPHORUS BEDDOMEANUS (Gies.) C. Chr. Ind. Fil. (1906) 198; v. A. v. R. Mal. Ferns 695.

Niphobolus beddomeanus Gies. Farng. Niph. (1901) 101.

AMBOINA, Hitoe lama, *Rel. Robins. 1979*, October 8, 1913, on limestone rocks, altitude about 150 meters.

Distrib.: Northern India and southern China to New Guinea.

CYCLOPHORUS ADNASCENS (Sw.) Desv. in Berl. Mag. 5 (1811) 300; v. A. v. R. Mal. Ferns 681.

Polypodium adnascens Sw. Syn. Fil. (1806) 25, 222, *tab. 2, fig. 2.*

AMBOINA, Binting, *Rel. Robins. 1932*, August 28, 1913, on trees at low altitudes.

Distrib.: Tropical Asia to Polynesia.

LOXOGRAMME Presl

LOXOGRAMME INVOLUTA (Don) Presl Tent. Pterid. (1836) 215; v. A. v. R. Mal. Ferns 537.

Grammitis involuta Don Prodr. Fl. Nepal. (1825) 14.
Polypodium scolopendrium C. Chr. Ind. Fil. (1906) 562.

AMBOINA, Soja, *Rel. Robins. 1930*, August 30, 1913, on rocks, altitude 300 meters.

Distrib.: China, tropical Asia, and Melanesia.

DRYNARIA J. Smith

DRYNARIA SPARSISORA (Desv.) Moore Ind. Fil. (1862) 348; v. A. v. R. Mal. Ferns 699.

Polypodium sparsisorum Desv. in Berl. Mag. 5 (1811) 315.

AMBOINA, Ayer putri, *Robinson Pl. Rumph. Amb. 450*, July 28, 1913, epiphytic at low altitudes.

Representing: POLYPODIUM INDICUM MAJUS (PILOSUM), Rumph. Herb. Amboin. VI, 78, t. XXXVI.

Distrib.: Ceylon to the Philippines, Polynesia, and Queensland.

MATONIACEAE

MATONIA R. Brown

MATONIA FOXWORTHYI Copel. in Philip. Journ. Sci. 3 (1908) Bot. 342, *t. 2.*

AMBOINA, Salahoetoe, *Rel. Robins. 1982*, November 27, 1913, common in places, altitude 300 to 800 meters. New to Ambonia.

Distrib.: Borneo.

GLEICHENIACEAE

GLEICHENIA Smith

GLEICHENIA MICROPHYLLA R. Br. Prodr. Flor. Nov. Holl. (1810) 161.

Gleichenia circinata auctt. plur. (not Sw.) C. Chr. Ind. Fil. (1906) 320; v. A. v. R. Mal. Ferns 56.

Var. **SEMIVESTITA** (Lab.) comb. nov.

Gleichenia semivestita Lab. Sert. Austr. Cal. (1824) 8, *tab. 11.*

AMBOINA, Salahoetoe, *Rel. Robins. 1980,* November 27, 1913, in open places, altitude about 850 meters.

Distrib.: Malaya, Australia, Tasmania, New Caledonia, New Zealand.

GLEICHENIA LAEVIGATA (Willd.) Hook. Sp. Fil. 1 (1844) 10; v. A. v. R. Mal. Ferns 59.

Mertensia laevigata Willd. Sp. Pl. 5 (1810) 75.

AMBOINA, Salahoetoe, *Rel. Robins. 1978,* November 27, 1913, altitude about 850 meters.

Distrib.: Malaya.

GLEICHENIA AMBOINENSIS v. A. v. R. in Bull. Dépt. Agr. Néerl. Ind. 18 (1908) 3; Mal. Ferns 62.

AMBOINA, Salahoetoe, *Rel. Robins. 1977,* November 27, 1913, in open places, altitude about 925 meters.

This may be a more compound form of *Gleichenia hirta* Bl., but it is not identical with a duplicate of *Elmer 10909* from Mount Apo, Mindanao, in the Buitenzorg Herbarium.

Distrib.: Amboina and Buru.

GLEICHENIA LINEARIS (Burm.) Clarke in Trans. Linn. Soc. Bot. 1 (1880) 428; v. A. v. R. Mal. Ferns 59.

Polypodium lineare Burm. Fl. Ind. (1768) 235, *t. 17, fig. 2.*

Var. **FERRUGINEA** (Bl.) comb. nov.

Gleichenia ferruginea Bl. Enum. Pl. Jav. (1828) 249, affin.

AMBOINA, Batoe mera, *Robinson Pl. Rumph. Amb. 446,* on rocks at low altitudes, July 18, 1913, locally known as *paku kawa.*

Representing: FELIX CALAMARIA Rumph. Herb. Amboin. VI, 85, tab. XXXVIII.

Distrib.: The type paleotropical, the variety scattered here and there.

SCHIZAEACEAE

SCHIZAEA Smith

SCHIZAEA DICHOTOMA (L.) Sm. in Mém. Acad. Turin 5 (1793) 422, *tab. 9, fig. 9;* v. A. v. R. Mal. Ferns 116.

Acrostichum dichotomun L. Sp. Pl. (1753) 1068.

AMBOINA, Salahoetoe, *Robinson Pl. Rumph. Amb. 460,* November 27, 1913, altitude about 200 meters.

Representing: EQUISETUM AMBOINICUM SILVESTRE Rumph. Herb. Amboin. VI, 92.

Distrib.: Madagascar, Mascarenes, tropical Asia, Australia, and Polynesia.

SCHIZAEA MALACCANA Baker Syn. Fil. (1868) 428; v. A. v. R. Mal. Ferns 116.

AMBOINA, Salahoetoe, *Rel. Robins. 1972,* November 27, 1913, altitude about 600 meters.

Distrib.: Burma, Malaya, Philippines.

LYGODIUM Swartz

LYGODIUM CIRCINATUM (Burm.) Sw. Syn. Fil. (1806) 153; v. A. v. R. Mal. Ferns 111.

Ophioglossum circinnatum Burm. Fl. Ind. (1768) 228.

AMBOINA, Amahoesoe, *Robinson Pl. Rumph. Amb. 451*, August 13, 1913, on limestone formation, altitude 30 meters; Binting, *Robinson Pl. Rumph. Amb. 542*, on limestone formation, altitude 5 meters; locally known as *paku kawa*.

Representing: ADIANTHUM VOLUBILE POLYPOIDES (*sive* MAJUS) Rumph. Herb. Amboin. VI, 75, tab. XXXIII, and A. v. MEDIUM Rumph. l. c. 75.

Distrib.: Tropical Asia to Queensland.

LYGODIUM SCANDENS (Linn.) Sw. in Schrad. Journ. 1800[2] (1801) 106; v. A. v. R. Mal. Ferns 111.

Ophioglossum scandens Linn. Sp. Pl. ed. 2 (1763) 1063.

AMBOINA, Soja road, *Robinson Pl. Rumph. Amb. 453*, August 20, 1913, in thickets, altitude about 70 meters; near the town of Amboina, *Robinson Pl. Rumph. Amb. 454*, October 27, 1913, in light woods, altitude about 30 meters; locally known as *paku kawa*.

Representing: ADIANTHUM VOLUBILE MINUS Rumph. Herb. Amboin. VI, 76 tab. XXXII, fis. 2–3 (No. 453), and A. v. MINUS ALTERUM Rumph. l. c. 76 (No. 454).

Distrib.: Tropical Africa, Asia, Australia, and Polynesia.

LYGODIUM FLEXUOSUM (Linn.) Sw. in Schrad. Journ. 1800[2] (1801) 106, p. p.; v. A. v. R. Mal. Ferns 114.

Ophioglossum flexuosum Linn. Sp. Pl. ed. 2 (1763) 1063.

AMBOINA, hills behind the town of Amboina, *Rel. Robins. 1975*, October 27, 1913, in light woods, altitude about 30 meters.

Distrib.: Southern China, Malaya, and Queensland.

LYGODIUM DIMORPHUM Copel. in Philip. Journ. Sci. 6 (1911) Bot. 67 (July 2).

Lygodium novo-guinense Ros. in Fedde Rep. 9 (1911) 427 (August 15).

AMBOINA, Batoe merah, *Rel. Robins. 1981*, August 24, 1913, in ravines, altitude about 20 meters; locally known as *paku kawa*.

Mr. Merrill thought that this specimen was a more compound form of *L. semihastatum* Desv. In my opinion it is absolutely identical with Copland King's No. 134 from New Guinea, on which Copeland based his diagnosis of *Lygodium dimorphum*. Of this number we also possess a duplicate, and we have a specimen, from Skore (New Guinea, leg. Treub), bearing on the very same rachis: *a*, sterile pinnae like those of *L. dimorphum*; *b*, fertile pinnae like those of *L. dimorphum* and of *L. semihastatum*, but the latter only sparingly spiciferous; *c*, fertile pinnae more or less resembling those of *L. trifurcatum* Bak., as intermediates between those mentioned under *b*. It may be possible, that *L. dimorphum* is a strongly developed form of *L. semihastatum* and that Treub's plant unites both extremes as well as the intermediate; or the first two are not identical and *L. dimorphum* shows, when in a juvenile state, forms resembling *L. semihastatum* and *L. trifurcatum*. The true Philippine *L. semihastatum* apparently never reaches the strong development of the Papuan *L. dimorphum*, and the

sterile pinnae of the former are described as palmate or 2-partito-palmate while those of the latter are once or twice forked.

Distrib.: New Guinea.

MARATTIACEAE

MARATTIA Swartz

MARATTIA FRAXINEA Sm. Pl. Ic. 2 (1790) *tab. 48;* v. A. v. R. Mal. Ferns 765.

AMBOINA, Soja, *Rel. Robins. 1971,* August 31, 1913, along streams in forests, altitude about 400 meters.

Perhaps identical with *M. pellucida* Presl.

Distrib.: Tropical Africa, Asia, and Australia.

OPHIOGLOSSACEAE

OPHIOGLOSSUM Linnaeus

OPHIOGLOSSUM PENDULUM Linn. Sp. Pl. ed. 2 (1763) 1518; v. A. v. R. Mal. Ferns 777.

AMBOINA, Soja, *Robinson Pl. Rumph. Amb. 440,* August 2, 1913, in forests, altitude 400 meters.

Represnting: SCOLOPENDRIA MAJOR Rumph. Herb. Amboin. VI, 84, tab. XXXVII, fig. 3.

Distrib.: Tropical Asia, Australia, and Polynesia.

HELMINTHOCTACHYS Kaulfuss

HELMINTHOSTACHYS ZEYLANICA (Linn.) Hook. Gen. Fil. (1840) *t. 47.*

Osmunda zeylanica Linn. Sp. Pl. (1753) 1063.

AMBOINA, Kati Kati, *Robinson Pl. Rumph. Amb. 455,* October 28, 1913, altitude about 70 meters.

Representing: OPHIOGLOSSUM LACINIATUM Rumph. Herb. Amboin. VI, 153, tab. LXVIII, fig. 3.

Distrib.: Tropical Asia to tropical Australia and New Caledonia.

LYCOPODIACEAE

LYCOPODIUM Linnaeus

LYCOPODIUM CERNUUM Linn. Sp. Pl. (1753) 1566. v. A. v. R. Mal. Fern All. 47.

AMBOINA, Batoe merah and Soja road, *Robinson Pl. Rumph. Amb. 457,* July, 1913, altitude sea level to 250 meters, locally known as *daun rai rai.* The spikes are partly cernuous, partly erect.

Representing: CINGULUM TERRAE Rumph. Herb. Amboin. VI, 87, tab, XL, fig. 1.

Distrib.: Tropical and extra-tropical.

LYCOPODIUM PHLEGMARIA Linn. Sp. Pl. (1753) 1564; v. A. v. R. Mal. Fern All. 44.

Var. **LONGIFOLIUM** Spring, Monog. Lycop. 1 (1842) 65; v. A. v. R. l. c. 45.

AMBOINA, Binting, *Robinson Pl. Rumph. Amb. 456,* August 13, 1913, on trees at low altitudes.

Representing: EQUISETUM AMBOINICUM ARBOREUM SQUAMATUM (*sive* FOLIATUM) Rumph. Herb. Amboin. VI, 91, tab. XLI, fig. 1.

Distrib.: Malaya.

LYCOPODIUM CARINATUM Desv. in Lam. Encycl. Suppl. 3 (1813) 555; v. A. v. R. Mal. Fern All. 36.

ABOINA, Amahoesoe, *Rel. Robins. 1973*, August 30, 1913, on trees at low altitudes, locally known as *bunga ranti*.

In habit this specimen resembles very much *Lycopodium laxum* Presl (non Spring), but the leaves are longer and not rigid.

Distrib.: Tropical Asia to Polynesia.

SELAGINELLACEAE

SELAGINELLA Linnaeus

SELAGINELLA ROBINSONII v. A. v. R. sp. nov.

Heterophyllum, Monostelicae, Intertextae.—S. brevipinnae v. A. v. R. affinis. Caules decumbentes, repentes, dichotomi vel subpinnati, probabiliter caespitosi, graciles, usque ad 0.5 mm crassi, straminei, in sicco irregulariter sulcati, foliis lateralibus inclusis 3.5 ad 4 mm lati; caules secundarii pinnati; pinnae remotae, obliquae, simplices, furcatae vel subpinnatae; ramuli ultimi usque ad ± 6 mm longi, 1.5 ad 2.25 mm lati. Folia heteromorpha; folia lateralia patentia remotaque; lateralia caulina late ovata, 1.75 ad 2.25 mm longa, usque ad 1.5 mm lata, valde inaequilatera, obtusa vel obtusiuscula, supra minute (sed sat copiose) papilloso-puberula, semifacie superiore apicem versus obsolete serrulata, ceterum serrulata et basin late rotundato-cordatam versus sensim ciliata, semifacie inferiore subintegerrima vel obsolete serrulata, ad basin anguste rotundato-cordatam saepe parce ciliolato-serrulata, costa in $\frac{2}{3}$ supra basin evanescente; lateralia ramulorum ultimorum usque ad 1.5 mm longa, minus inaequilatera, magis remote serrulata et ciliata, basi superiore rotundato-cuneata, basi inferiore rotundata; folia intermedia erecta; intermedia caulina remota, ovata usque ad 1 mm longa, longe acuminata ad cuspidata, subcarinata, semifacie exteriore minute serrulata, basi producta et rotundato-subcordata, semifacie interiore ciliata, basi rotundata vel rotundato-cuneata; intermedia ramulorum ultimorum minora, contigua. Spicae solitariae vel 2-nae, 4 ad 6 mm longae, 2 ad 2.5 mm latae; sporophylla lateralia patentia, subremota, lanceolata, breviter subapiculato-acuminata, supra glabra vel breviter puberula, carinata, margine superiore carinaque remote ciliata; sporophylla intermedia erecta, imbricata, ovata, longe acuminata, proportione longi-ciliata; sporae . . . . (microsporae juveniles flavidae vel aurantiacae, minute verruculosae).

AMBOINA, Salahoetoe, *Rel. Robins. 1987*, November 27, 1913, terrestrial, altitude 150 to 250 meters.

SELAGINELLA POUZOLZIANA (Gaudich.) Spring Monogr. Lycop. 2 (1842) 142; v. A. v. R. Mal. Fern All. 216.

Lycopodium pouzolziana Gaudich. in Freyc. Voy. Bot. (1827) 287.

According to Spring's diagnosis this species is said to have the axillary leaves obovate, narrowed at the base, and the lateral leaves entire.

AMBOINA, Kati-Kati, *Rel. Robins. 1984*, October 17, 1913, along small streams, altitude about 70 meters.

Forma *typica:* Lower axillary leaves broadly cordate or ovate, broadest at or near the base; lateral leaves often, if not invariably, very minutely serrulate-denticulate toward the apex; macrospores verruculose, whitish or pale-brown when young, gray-brown or black-brown when mature; microspores whitish or yellowish, provided with crowded, bacilliform or stipitate-capitate projections.

Distrib.: Nicobar Islands to the Moluccas, Formosa, and southern China.

SELAGINELLA CUPRESSINA (Willd.) Spring Monogr. Lycop. 2 (1842) 153 p. p.; v. A. v. R. Mal. Fern All. 140.

Lycopodium cupressinum Willd. Sp. Pl. 5 (1810) 42.

AMBOINA, near the town of Amboina, *Rel. Robins. 1983*, July 26, 1913, on shaded banks, locally known as *rutu rutu.*

Largest lateral leaves 2.5 mm or more long; intermedial leaves, at least those of the principal rachises, finely serrulate. *Selaginella leytensis* Hieron. is near this, but differs in having the branching less compound and looser, the rachises narrower, and the largest lateral leaves at most 2.5 mm long.

Distrib.: Borneo, Sumbawa, the Philippines, and New Guinea.

SELAGINELLA BELANGERI (Bory) Spring Monogr. Lycop. 2 (1842) 242; v. A. v. R. Mal. Fern All. 172.

Lycopodium belangeri Bory Voy. (1804) 16, *tab. 1, fig. 2.*

AMBOINA, Batoe Gadjah, *Rel. Robins. 1986*, August 5, 1913; near the town of Amboina, *Rel. Robins. 1985*, July 30, 1913.

Distrib.; British India across Malaya to Papua and northern Australia.

SELAGINELLA D'URVILLEI (Bory) A. Br. in Verh. Zool. Bot. Ges. (1869) 585; v. A. v. R. Mal. Fern All. 225.

Lycopodium d'Urvillei Bory Voy. (1804) 245, p. p.

AMBOINA, Hatiwe, *Robinson Pl. Rumph. Amb. 459*, September 4, 1913, in light woods at low altitudes.

Representing: MUSCUS FRUTICESCENS MAS Rumph. Herb. Amboin. VI, 86, tab. XXXIX, fig. 2 (?).

Distrib.: Amboina to Polynesia.

SELAGINELLA PLANA (Desv.) Hieron. in Engl. & Prantl. Nat. Pflanzenfam. 1[4] (1900) 703; v. A. v. R. Mal. Fern All. 215.

Lycopodium planum Desv. in Lam. Encycl. Suppl. 3 (1813) 158.

AMBOINA, Gelala, *Robinson Pl. Rumph. Amb. 458*, July 16, 1913, on banks at low altitudes, locally known as *daun rutu rutu perampuan.*

Representing: MUSCUS FRUTICESCENS FOEMINA Rumph. Herb. Amboin. VI, 86, tab. XXXIX, fig 1.

Distrib.: Malaya to British India.

PSILOTACEAE

PSILOTUM Swartz

PSILOTUM TRIQUETRUM Sw. Syn. Fil. (1806) 117; v. A. v. R. Mal. Fern All. 24.

AMBOINA, Batoe Gadjah, *Robinson Pl. Rumph. Amb.* 461, August, 1913; Amahoesoe, Robinson *Pl. Rumph. Amb. 462*, September 16, 1913, on trees, altitude sea level to 150 meters.

Representing: EQUISETUM AMBOINICUM SECUNDUM Rumph. Herb. Amboin. VI, 92.

Distrib.: Tropical and extra-tropical.

LIST OF PTERIDOPHYTA DESCRIBED BY RUMPHUS IN THE HERBARIUM AMBOINENSE

In the following list those species included in brackets do not occur in Doctor Robinson's collection:

Adianthum volubile polypoides (majus), 75, tab. XXXIII=*Lygodium circinatum* Sw.

Adianthum volubile medium, 75=*Lygodium circinatum* Sw.

Adianthum volubile minus, 76, tab. XXXII, fig. 2, 3=*Lygodium scandens* Sw.

Adianthum volubile minus alterum, 76=*Lygodium scandens* Sw.

Capillus veneris Amboinicus, 77, tab. XXXIV, fig. 1=[*Adiantum* sp.].

Cingulum terrae, 87, tab. XL, fig. 1=*Lycopodium cernuum* L.

Dryopteris triplex arborea, 73, tab. XXXII, fig. 1=*Davallia elata* Spr.

Dryopteris triplex campestris, 74, tab. XXXIV, fig. 2=*Cheilanthes tenuifolia* Sw.

Dryopteris triplex sylvestris terrestris, 73=*Tapeindium amboynense* C. Chr. (?)

Dryoptris triplex sylvestris petraea, 74=[*Adiantum* or *Lindsaya*?].

Equisetum amboinicum arboreum squamatum (foliatum), 91, tab. XLI, fig. 1=*Lycopodium phlegmaria* L. var *longifolium* (?).

Equisetum amboinicum minor, 92=[*Lycopodium nummularifolium* Bl.?].

Equisetum amboinicum secundum, 92=*Psilotum triquetrum* Sw.

Equisetum amboinicum silvestre=*Schizaea dichotoma* Sw.

Filix amboinica mas (agrestis), 69=*Dryopteris ferox* O. Ktze.

Filix amboinica urens, 69=?

Filix aquatica, 65, tab. XXVIII=[*Angiopteris amboinensis* de Vr.?].

Filix calamaria, 85, tab. XXXVIII=*Gleichenia linearis* Clarke (*typica* or var. *ferruginea* aff.?).

Filix canarina, 64=?

Filix esculenta (femina), 67, tab. XXIX=[*Diplazium esculentum* Spr.].

Filix florida, 78, tab. XXXV, fig. 1=*Stenosemia aurita* Pr.

Filix lanuginosa, 69=[*Cibotium baranetz* J. Sm. or *Dicksonia sorbifolia* Sm.].

Lonchitis amara, 72=?

Lonchitis amboinica recta major rubra, 70, tab. XXX, fig. 1=[*Blechnum orientale* L.?].

Lonchitis amboinica recta major alba, 70 tab. XXX, fig. 2=[*Polypodium pallens* Bl.?].

Lonchitis amboinica recta minor nigra, 71=*Aspidium repandum* Willd.

Lonchitis amboinica recta minor alba, 71=?

Lonchitis mucosa, 72=?

Lonchitis pilosa, 72=?

Lonchitis saguaria, 72=?

Lonchitis volubilis, 71, tab. XXXI=[*Stenochlaena sp.*].

Millefolium aquaticum, 176, tab. LXXIV, tab. 1=[*Ceratopteris thalictroides* Brongn.].

Muscus fruticescens foemina, 86, tab. XXXIX, fig.. 1=*Selaginella plana* Hieron.

Muscus fruticescens mas, 86, tab. XXXIX, fig. 2=*Selaginella d'Urvillei* A. Br. (?).

Ophioglossum indicum simplex, 152, tab. LXVIII, fig. 2=[*Ophioglossum pedunculosum* Desv.].

Ophioglossum laciniatum, 153, tab. LXVIII, fig. 3=*Helminthostachys zeylanica* Hook.

Palmafilix alba, 63=*Alsophila rumphiana* v. A. v. R. (?).

Palmafilix nigra, 63, tab. XXVII (?) =*Alsophila amboinensis* v. A. v. R. (?).

Palmafilix postium, 63=?

Phyllitis amboinica arborea, 82, tab. XXXVII, fig. 1=*Asplenium nidus* L.

Phyllitis amboinica terrestris, 82, tab. XXXVII, fig. 2=?

Phyllitis polycipes, 76=?

Polypodium indicum majus (pilosum), 78, tab. XXXVI=*Drynaria sparsisora* Moore.

Polypodium indicum minus (glabrum), 78, tab. XXXV, fig. 2=*Pleopeltis phymatodes* Moore.

Scolopendria Indiae orientalis Musae facie, 83=[*Platycerium coronarium* Desv.].

Scolopendria major, 84, tab. XXXVII, fig. 3=*Ophioglossum pendulum* L.

Scolopendria minor (sive tectorum), 84=*Pleopeltis sinuosa* Bedd. (?).

EXPLANATION OF THE PLATES

[From drawings by the author.]

PLATE V

FIG. 1. *Trichomanes minutissimum* v. A. v. R.

a', rhizome with variously shaped fronds, natural size.

a'', rhizome with fronds showing the veins and sori, enlarged about 10 times.

2. *Trichomanes pervenulosum* v. A. v. R.

b', rhizome with variously shaped fronds, natural size.

b'', *b'''*, portions of a sterile and a fertile segment showing the spurious veinlets and a sorus, enlarged about 8 times.

PLATE VI

Drymoglossum fallax v. A. v. R.

a, rhizome with fronds, natural size.

b', *b''*, rhizome scales, enlarged about 50 times.

c, portion of a sterile frond showing the venation, enlarged about 5 times.

d', portion of a fertile frond, lower surface, showing the sori and paraphyses, enlarged 10 to 15 times.

d'', transverse section of a fertile frond showing the capsules and paraphyses, enlarged 10 to 15 times.

e, stellate hairs flanking the sori, enlarged about 40 times.

f, paraphyses separating the capsules, enlarged about 40 times.

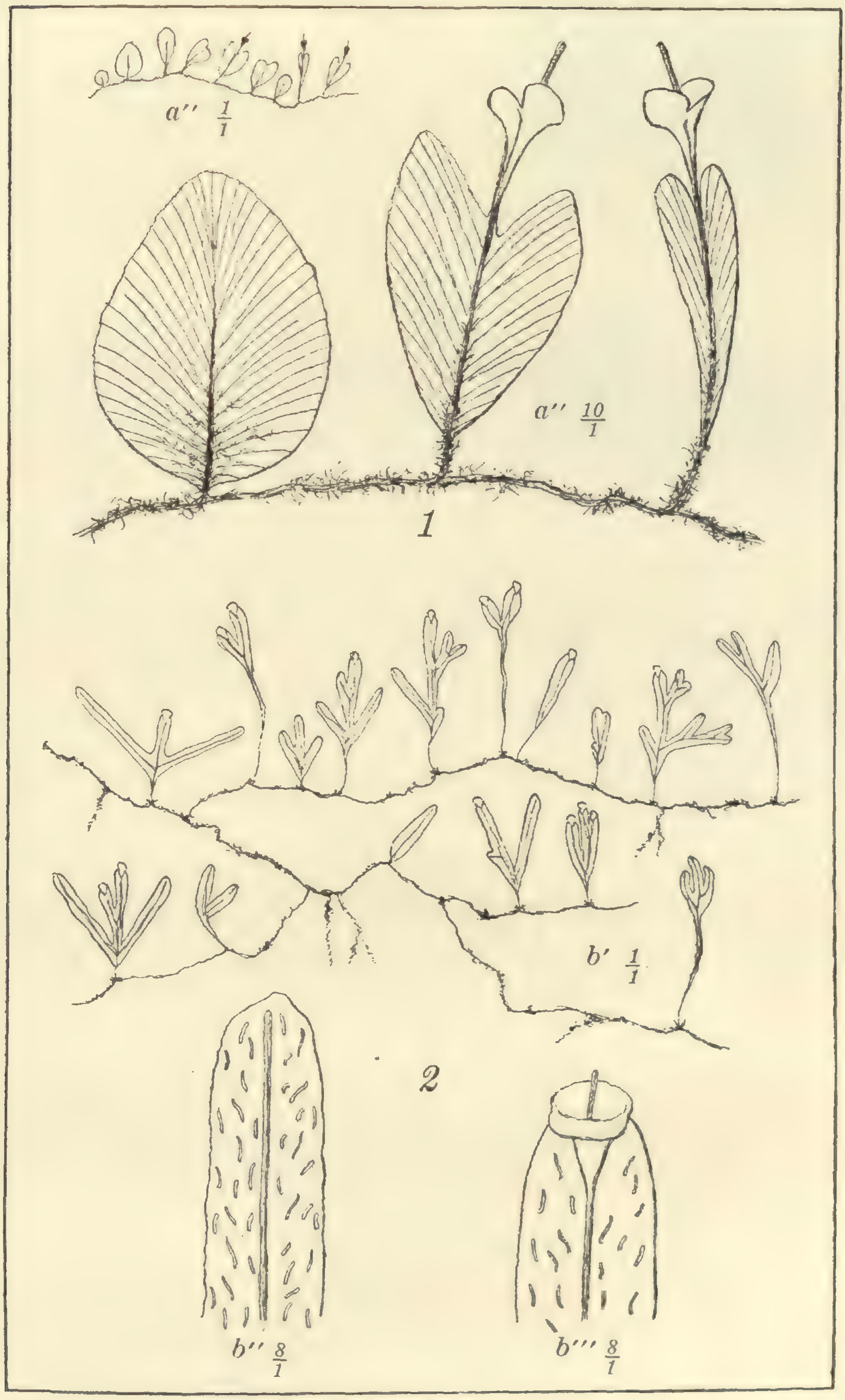
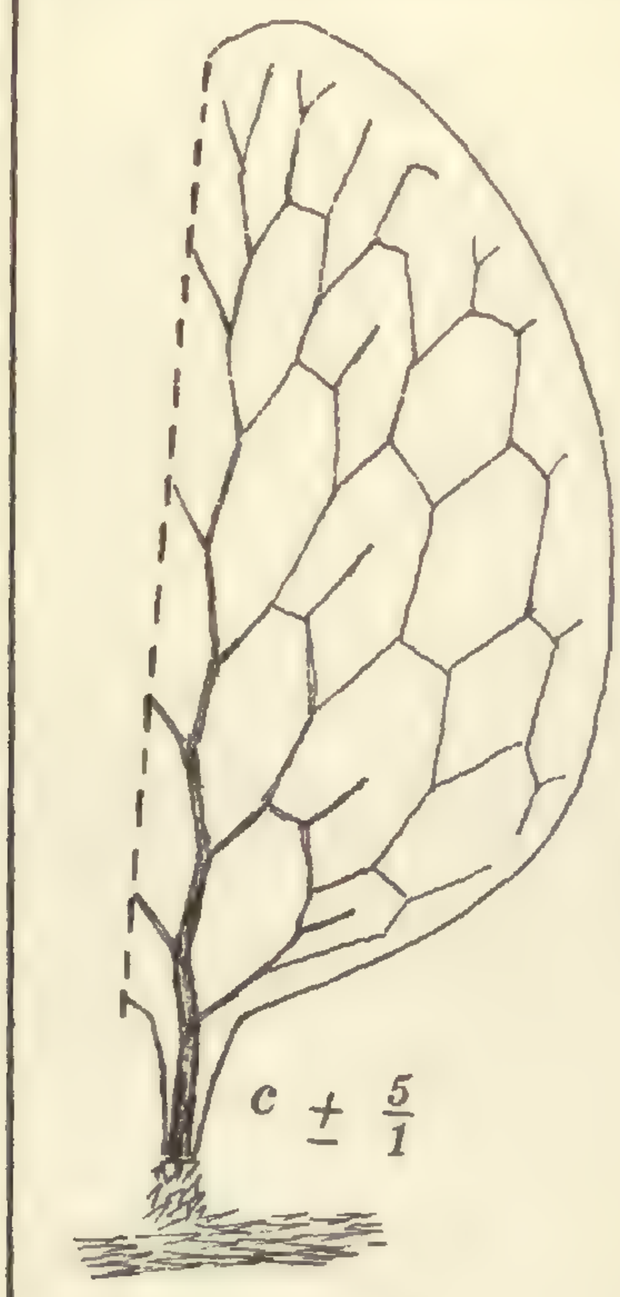
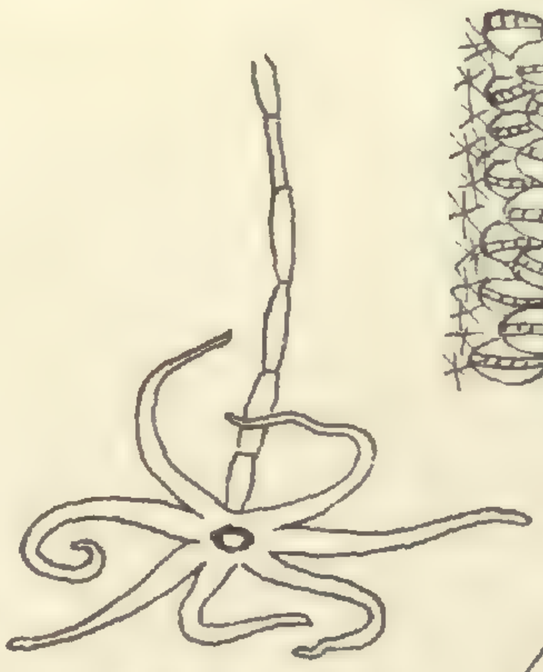


Fig. 1. Trichomanes minutissimum v. A. v. R. 2. T. pervenulosum v. A. v. R.

PLATE V.

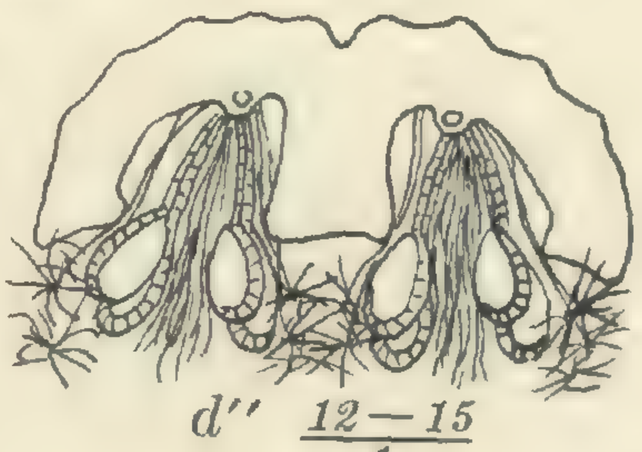


c ± 5/1



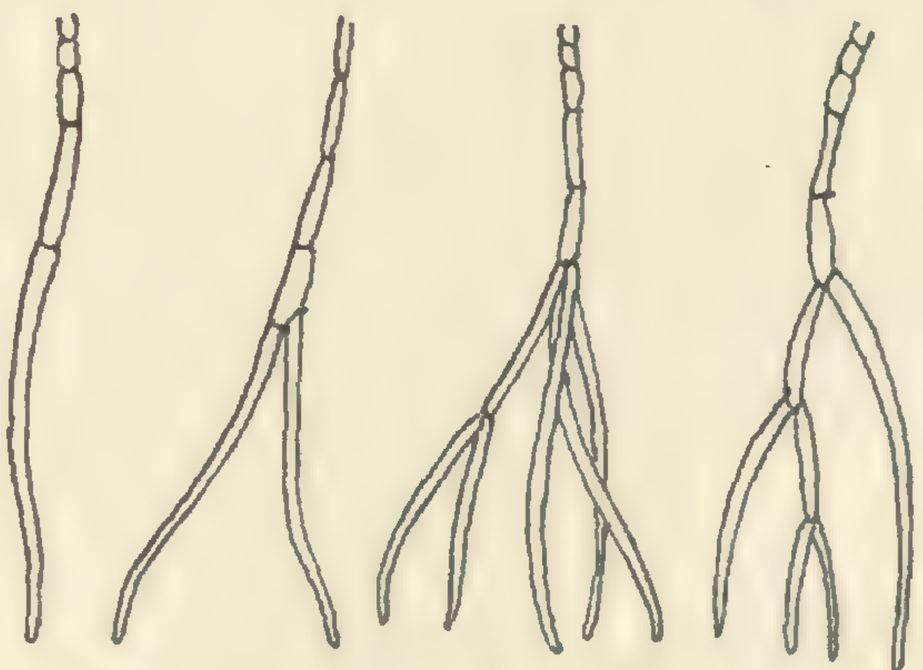
e ± 40/1

d' 12—15/1

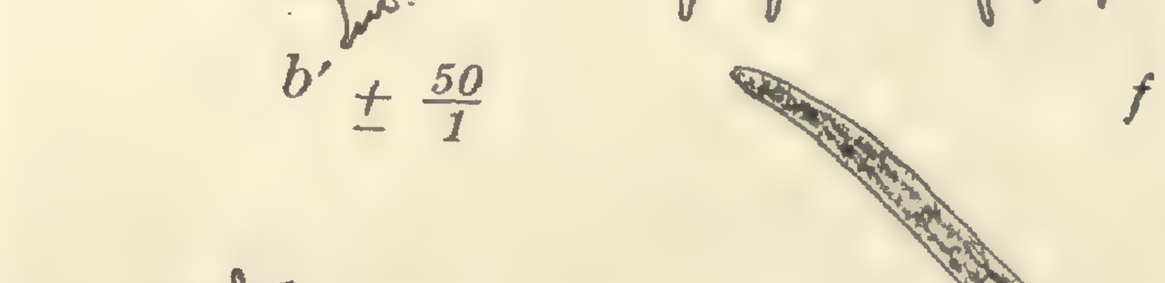


d'' 12—15/1

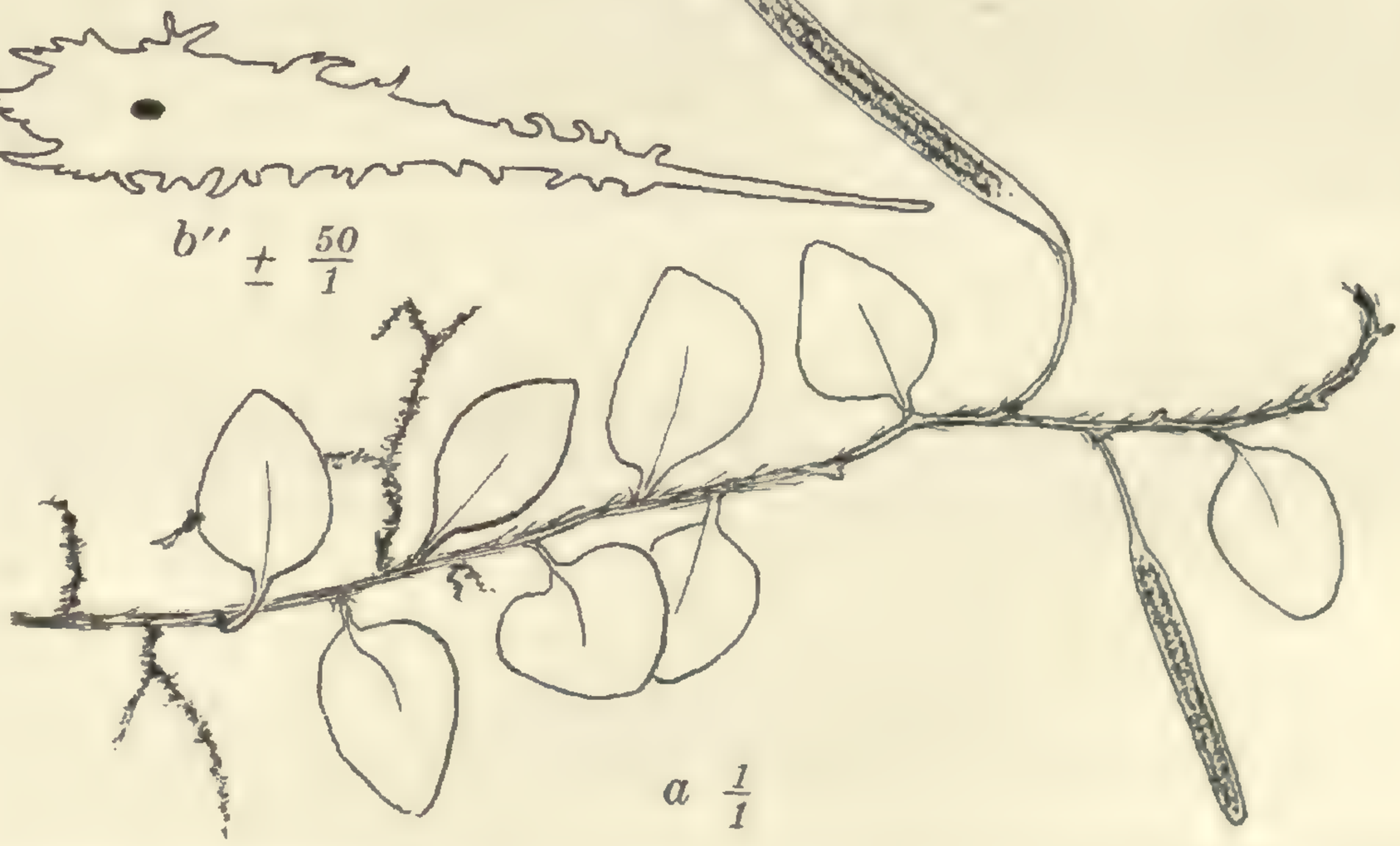
b' ± 50/1



f ± 40/1



b'' ± 50/1



a 1/1

PLATE VI. DRYMOGLOSSUM FALLAX v. A. v. R.

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NEW OR INTERESTING PHILIPPINE VITACEAE

By E. D. MERRILL *

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

In the present paper are included notes on various of the older and better known species of *Vitaceae*, with descriptions of new species in the genera *Ampelocissus, Cissus, Columella* (*Cayratia*), *Tetrastigma*, and *Leea*. Fourteen new species and a few new varieties are described, while some new combinations are made. The most radical change in proposed or accepted nomenclature is the adoption of the generic name *Columella* of Lourerio, dating from the year 1790, for those species placed by Planchon in *Cissus* § *Cayratia*, but more recently by Doctor Gagnepain placed under *Cayratia* as a valid genus. The adoption of *Columella* of Lourerio for this genus of *Vitaceae* will invalidate the genus *Columellia* of Ruiz & Pavon which typifies the family *Columelliaceae*. This action in restoring Lourerio's generic name is taken deliberately in order that the case may be brought to the attention of botanists generally, and that at some later date perhaps *Cayratia* may be included in the lists of *nomina conservanda* supplementary to those already adopted by the Vienna and Brussels Botanical Congresses.

AMPELOCISSUS Planchon

AMPELOCISSUS OCHRACEA (Teysm. & Binn.) comb. nov.

Cissus ochracea Teysm. & Binn. in Nat. Tijdschr. Nederl. Ind. 27 (1864) 35.

Vitis ochracea Teysm. ex Planch. in DC. Monog. Phan. 5 (1887) 409, in syn.; Ceron Cat. Pl. Herb. (Manila) (1892) 51.

Ampelocissus imperialis Merr. & Rolfe in Philip. Journ. Sci. 3 (1908) Bot. 110, non Planch.

CULION, *Merrill 668*, February, 1903. MINDANAO, Lake Lanao, Camp Keithley, *Mrs. Clemens 331*, March, 1906, *s. n.*, November, 1906: District of Davao, Mati, *Piper 447*, May, 1911: Province of Agusan, *Elmer 13600*, August, 1912. BASILAN, *Hallier s. n.* (sterile), January, 1904.

Var. TRILOBATA var. nov.

A typo differt foliis profunde trilobatis.

POLILLO, *Bur. Sci. 10773 McGregor*, November, 1909. LUZON, Province of Tayabas, Infanta, *Bur. Sci. 9351 Robinson*, August, 1909. MINDANAO, Province of Surigao, Hinatuan, *Piper 490*, May, 1911.

* Associate professor of botany, University of the Philippines.

This species has previously been reported from the Philippines as *Ampelocissus imperialis* Planch., but that identification was certainly erroneous, although manifestly *Ampelocissus ochracea* and *A. imperialis* are closely allied. There is now a specimen in the herbarium of the Bureau of Science collected in Sumatra by Teysmann, manifestly a cotype of *Ampelocissus imperialis* (Miq.) Planch., which differs from our Philippine material in its larger, more numerously nerved leaves, and especially in the basal lobes of the leaves overlapping. Planchon has reduced "*Vitis ochracea* Teysm." to *Ampelocissus imperialis*, but from his citation it is evident that he did not see the published description of *Cissus ochracea* T. & B. The type of Teysmann's species was from Celebes, a plant cultivated in the Botanical Garden at Buitenzorg, and his description appears to me to apply to our Philippine form and not to *Ampelocissus imperialis* Planch. I have accordingly reinstated Teysmann's species, and transferred it to its proper genus, *Ampelocissus*.

AMPELOCISSUS BOTRYOSTACHYS Planch. in DC. Monog. Phan. 5 (1887) 413; Gagnep. in Bull. Soc. Hist. Nat. Autun 24 (1911) 20.

This characteristic endemic species was based on a specimen collected by Cuming in the vicinity of Mount Banahao, Luzon, distributed as number 820 of Cuming's Philippine collection, but until recently has not been rediscovered. Additional specimens, all from the Province of Laguna, Luzon, are as follows: near Paete, *Baker 3695;* Lilio, *Gates 6471* coll. *Quisumbing;* San Antonio, *Bur. of Sci. 10994, 16660 Ramos.*

AMPELOCISSUS MARTINI Planch. in DC. Monog. Phan. 5 (1887) 373; Gagnep. l. c. 22.

Ampelocissus barbata Merr. & Rolfe in Philip. Journ. Sci. 3 (1908) Bot. 110, non Planch.

LUZON, Province of Batangas, Balayan, *Phil. Pl. 1879 Ramos*, August, 1914. CUYO, *Bur. Sci. 21376 Escritor*, July, 1913. PALAWAN, Apulit Island, Taytay Bay, *Merrill 9425*, May, 1913. BANTON, *McGregor 350*, July, 1905. GUIMARAS, *For. Bur. 43 Ritchie*, August, 1903. SEMERARA, *Merrill 4150*, June, 1905.

This was previously determined and reported as *Ampelocissus barbata* Planch., a very closely allied species, but Doctor Gagnepain has recently referred my number 4150 (not 3150 as cited by him) to the Indo-Chinese species *A. martini* Planch. After a reëxamination of our material, the descriptions, and a duplicate of *Pierre 1803* from Cochinchina, I agree with Gagnepain's identification of the Philippine specimen.

AMPELOCISSUS PAUCIFLORA sp. nov. § *Euampelocissus.*

Species ut videtur *A. aculeatae* et *A. acetosae* affinis, differt inermibus, omnibus partibus glabris, foliolis oblongo-ovatis ad ovato-lanceolatis, acute acuminatis, inflorescentiis paucifloris.

A slender, unarmed, scandent vine, entirely glabrous, 6 to 8 m in length, the branches and branchlets terete, brownish or purplish when dry, often glaucescent. Leaves pedately 5- to 7-foliolate, their petioles 2 to 2.5 cm long; leaflets submembranaceous or chartaceous, oblong-ovate to ovate-lanceolate, the outermost lateral ones smaller than the others, 4 to 8 cm long,

2 to 3.5 cm wide, the base acute, the apex rather slenderly and very sharply acuminate, the margins in the upper one-half or two-thirds with distant, small, usually appressed, sharp teeth, dull, the upper surface pale-yellowish to olivaceous when dry, the lower surface paler and more or less glaucous, the nerves and reticulations distinct; petiolule of the middle leaflet 7 to 10 mm long, the common one of the lateral leaflets usually a little longer, their petiolules proper 3 to 4 mm long. Peduncles leaf-opposed, slender, 7 to 9 cm long, forked, bearing the inflorescence and a slender, usually forked tendril. Cymes subumbellate, the flowers few, 6 to 15 in the material examined, umbellately arranged, their pedicels 2 to 3 mm long, the bracteoles oblong-ovate, 1 mm long. Calyx shallow, very obscurely 5-toothed, 1.2 mm in diameter. Petals 5, free, purple, oblong, obtuse, 2 mm long, cucullate. Filaments about 1 mm long, more or less flattened; anthers orbicular-ovoid, 0.5 mm long. Ovary apparently purple, ovoid, distinctly 5-angled, 1 to 1.2 mm long, the style none. Fruit dark-purple or nearly black, fleshy, globose, 7 to 9 mm in diameter when dry and often somewhat glaucous, containing three or four seeds. Seeds narrowly obovoid, 6 mm long, smooth and shining, the base acute, the apex rounded, the two internal faces concave, the back convex, with a median, longitudinal, shallow depression bearing the linear-oblong chalaza; albumen T-shaped in cross-section.

LUZON, Province of Zambales, Baquilin River, *For. Bur. 6957 Curran* (type), May 9, 1907, clambering over shrubs in dry river bed: Province of Bataan, Lamao River, *Merrill 3280*, October, 1903, in thickets on bluffs along the seashore: Province of Union, San Fernando, *Bur. Sci. 21116 Escritor*, June, 1913. CUYO, *Bur. Sci. 21363 Escritor*, July, 1913. PALAWAN, Taytay, *Merrill 9377*, May, 1913, in thickets along the seashore. CALUSA, *Bur. Sci. 15659 Fénix*, July, 1912.

A species well characterized by its pedately 5- to 7-foliolate leaves, its sharply acuminate leaflets which are more or less glaucous beneath, and its slenderly peduncled, few-flowered inflorescences.

AMPELOCISSUS MULTIFOLIOLA sp. nov. § *Kalocissus.*

Frutex scandens subtus foliis petiolis ramulis inflorescentiisque dense rufo-tomentosis, vel ramulis pallide tomentosis, foliis pedatim 13-foliolatis, foliolis anguste oblongis vel oblongo-lanceolatis, usque ad 20 cm longis, acuminatis supra repando-dentatis; inflorescentiis pedunculatis, spicis numerosis, patulis, gracilis, 2 ad 5 cm longis; floribus 5-meris, glabris, brevibus; fructibus carnosis, ellipsoideis, 2 cm longis.

A scandent tendril-bearing shrub, the branches terete, tomentose with rather long, matted hairs which in age become nearly

white. Tendrils stout, 40 cm long and upward. Leaves pedate-palmately compound, each with 13 leaflets, the three central leaflets palmate, their petioles 2.5 to 3 cm long, the other 5 leaflets on each side serially attached to a branch of the petiole which is 5 to 6 cm long, subscorpoid in arrangement; leaflets narrowly oblong to oblong-lanceolate, chartaceous, the central ones 18 to 20 cm long, about 3 cm wide, the outer lateral ones shorter, the outermost one very inequilateral, all distantly sinuate-toothed above the middle, subacute and somewhat inequilateral at the base, or the outermost ones rounded, sharply acuminate at the apex, the upper surface glabrous and shining, the lower densely rufous-tomentose, the lateral veins distinct, 7 to 9 on each side of the midrib; petiolules tomentose, those of the interior leaflets 2.5 to 3 cm long, of the outer ones progressively shorter, the outermost leaflets subsessile. Inflorescence tomentose, peduncled, the flower-bearing part 15 to 20 cm long, the spikes 20 to 30, slender, spreading, 4 to 5 cm long. Flowers 5-merous, sessile, glabrous, scattered, each subtended by a small bracteole, the calyx shallow, 1.5 mm in diameter, obscurely toothed. Petals 5, oblong-elliptic, acute, 2.5 mm long. Anthers about 0.8 mm long. Ovary ovoid, sulcate, glabrous. Fruit very fleshy, pink, glabrous, ellipsoid, rounded, 2 cm long, with a single seed, the seed narrowly ovate in outline, acuminate, base rounded or slightly cordate, about 1 cm long, 3-angled, two lateral angles much sharper than the inner one, the back with an obscure protuberance, the outer face convex, the inner two slightly concave.

LUZON, Province of Laguna, Dahican, *Bur. Sci. 16539 Ramos*, September 14, 1912, in damp forests.

A most characteristic species, distinguishable by its leaf-characters from all forms previously described. The numerous leaflets, thirteen, are pedate-palmate in arrangement, the inner three with their proper petiolules, the outer five on each side attached to a common branch of the petiole proper.

AMPELOPSIS Michaux

AMPELOPSIS HETEROPHYLLA (Thunb.) Sieb. & Zucc. in Abhandl. Baier. Akad. Wissensch. 4² (1846) 197; Planch. in DC. Monog. Phan. 5 (1887) 455.

Var. **SINICA** (Miq.) comb. nov.

Vitis sinica Miq. in Journ. Bot. Néerl. 1 (1861) 125.
Ampelopsis heterophylla var. *hancei* Planch. in DC. Monog. Phan. 5 (1887) 457; Gagnep. in Mém. Soc. Hist. Nat. Autun 24 (1911) 6.

This variety is represented in our herbarium by over thirty specimens from the Philippines, from the Batanes Islands, Luzon, Mindoro, Palawan,

and Mindanao. It is especially abundant in Mountain Province, Luzon. It is widely distributed in southern China, and is known from Tonkin and Formosa.

Var. **HUMULIFOLIA** (Bunge) comb. nov.

Ampelopsis humulifolia Bunge Enum. (1831) 12.

Vitis heterophylla var. *humulifolia* Hook. f. in Curtis's Bot. Mag. *t. 5682.*

Ampelopsis heterophylla var. *bungei* Planch. in DC. Monog. Phan. 5 (1887) 455; Gagnep. l. c. 7.

LUZON, Province of Nueva Vizcaya, Bagabag, *Bur. Sci. 8170 Ramos;* Bontoc Subprovince, *Bur. Sci. 5973 Ramos,* intermediate between this variety and the preceding one. MINDANAO, District of Davao, *DeVore & Hoover 132.*

Widely distributed in China, extending southward to Hongkong, not previously reported from the Philippines.

Under our rules of priority, if these varieties are to be recognized, the earliest valid names must be adopted, not those arbitrarily selected by Planchon. Many American botanists would consider the specific name *heterophylla* S. & Z. (1846), to be invalidated in *Ampelopsis* by the earlier *Ampelopsis heterophylla* Blume (1825)=**PARTHENOCISSUS HETEROPHYLLA** (Blume) comb. nov. (*Cissus landuk* Hassk., *Vitis landuk* Miq., *Landukia landuk* Planch., *Parthenocissus landuk* Gagnep.).

CISSUS Linnaeus

CISSUS DISCOLOR Blume Bijdr. (1825) 181; Planch. in DC. Monog. Phan. 5 (1887) 354; Gagnep. in Not. Syst. 1 (1911) 354.

MINDANAO, Province of Misamis, Mount Malindang, *For. Bur. 4528, 4737 Mearns & Hutchinson,* May, 1906, altitude 700 to 1,500 m: District of Zamboanga, Sax River Mountains, *Merrill 8105,* November, 1911, altitude 900 m.

Gagnepain, l. c., refers to this species *Loher 377, 878,* from Luzon, which I have not seen. The Mindanao specimens agree closely with the descriptions of the species, and with specimens in the herbarium of the Bureau of Science determined by Gagnepain, *Thorel 1392* from Cochinchina, and *Bons d'Anty* from Yunnan.

India to southern China, southward to Java and Celebes.

CISSUS OBLONGIFOLIA sp. nov. § *Eucissus.*

Suffruticosa, scandens, inflorescentiis parce furfuraceis exceptis glabra; foliis oblongis vel oblongo-ovatis, membranaceis, 10 ad 20 cm longis, basi subtruncatis vel rariter acutis, apice breviter acuminatis, margine distanter denticulatis; cymis usque ad 10 cm longis; floribus 4-meris, 4 mm longis; fructibus oblongo-ovoideis, junioribus breviter rostratis, 1.2 ad 1.5 cm longis.

A scandent, tendril-bearing vine reaching a height of from 4 to 10 m, somewhat fleshy when fresh, the older stems somewhat compressed when dry, the younger ones straw-colored or somewhat greenish, terete or obscurely angled, smooth, slightly striate when dry, glabrous except the sparingly furfuraceous inflores-

cence. Leaves green, membranaceous, of the same color and shining on both surfaces when dry, oblong to oblong-ovate, 10 to 20 cm long, 3 to 8 cm wide, the upper ones usually smaller or at least narrower than the lower ones, the apex shortly acuminate, the base truncate, rarely subacute, never cordate, the margins with distant minute teeth opposite the excurrent ends of the primary and secondary nerves; nerves about 6 on each side of the midrib, rather prominent, the reticulations lax; petioles about 3 cm long. Tendrils leaf-opposed, entire, up to 20 cm long. Cymes axillary and terminal, lax, up to 10 cm long, peduncled. Flowers 4-merous, greenish-white, 4 mm long, the buds narrowly ovoid. Calyx cup-shaped, truncate. Petals oblong-ovate, 3 to 4 mm long, 2 mm wide, acute, glabrous. Anthers 1 mm long, longer than wide. Fruit dark-purple when mature, fleshy, ovoid, 1.2 to 1.5 cm long, when young oblong-ovoid and somewhat rostrate. Seed smooth, ovoid, base somewhat rostrate.

LUZON, Province of Bataan, Lamao River, *For. Bur. 2122* (type), *1927 Borden*, October, 1904, altitude about 130 meters, *Whitford 1056*, *Williams 248*, *586*, *Merrill 3793*, *Elmer 6669*, *For. Bur. 2193 Meyer:* Province of Laguna, Los Baños, *Bur. Sci. 6611 Robinson*, February, 1909. In thickets and forests, at low altitudes.

I originally wrote the description of this species in 1904, but later considered it to be the same as *Cissus rostrata* Korth., and so recorded it.[1] After an examination of the material in the Kew Herbarium, I came to the conclusion that *Cissus rostrata* Korth., was a different species, as yet not found in the Philippines, from which *Cissus oblongifolia* differs in its broader leaves which are not rostrate-acuminate at the apex. The present species is manifestly allied to *Cissus repens* Lam., but is distinguished by its quite differently shaped leaves and much larger flowers.

CISSUS QUADRANGULARIS L. Mant. 1 (1767) 39; Planch. in DC. Monog. Phan. 5 (1887) 510.

LUZON, Province of Cagayan, *For. Bur. 16871 Bacani*, February, 909: Province of Batangas, *Cuzner 41*, December, 1907: Manila, *Merrill s. n.* September, 1909. CEBU, *Barrow 25*, June, 1904. NEGROS, *Piper 50*, May, 1911. SIQUIJOR, *Piper 395*, May, 1911.

A species found in the drier parts of the Archipelago, with the appearance of having been introduced. It is well characterized by its stout, green, very fleshy, 4-angled stems, which shrink much in drying.

Tropical Africa and tropical Asia to Malaya.

CISSUS REPENS Lam. Encycl. 1 (1783) 31; Planch. in DC. Monog. Phan. 5 (1887) 504.

This species is based on *Neriam Pulli* Rheede Hort. Malabar. 7: *t. 48*, for Lamarck in his original description cites no specimen, giving only the reference to Rheede cited above and a reference to Ray's Historia Plantarum. Rheede's figure is an excellent one, but represents a plant with

leaves having a deeper and much narrower basal sinus than any Philippine material referred to the species that I have seen. In our abundant material the leaves are always broadly ovate, but with the basal sinus very broad and rather shallow, the base sometimes being truncate or subtruncate. I refer here the following material:

LUZON, Benguet Subprovince, *Elmer 6467:* Province of Nueva Ecija, *Bur. Sci. 5267 McGregor:* Province of Zambales, *Hallier s. n.:* Province of Bataan, *Williams 193, For. Bur. 1785 Borden, Merrill 3151, 1582, Elmer 6751:* Province of Laguna, *For. Bur. 13315 Tamesis, Bur. Sci. 12014 Ramos:* Province of Rizal, *Bur. Sci. 1386 Ramos:* near Manila, *Marave 135.* APO ISLAND, *Merrill 410.* PALAWAN, *Bur. Sci. 246 Bermejos.* TICAO, *For. Bur. 1071 Clark.* NEGROS, *For. Bur. 13704, 17425 Curran.* MINDANAO, District of Zamboanga, *Bur. Sci. 11787 Robinson:* District of Davao, *Piper 462:* District of Cotabato, *Bur. Sci. 11557 Robinson.*

One nearly constant character of the plants referred here is that they readily break up in drying, the stems breaking at the nodes and the leaves readily becoming detached, this fragile character being also indicated by Rheede for his *Neriam Pulli.* The plant is somewhat succulent and difficult to dry properly. The fruits are fleshy, purple, and very acrid to the taste. According to Borden the stinging sensation in the mouth lasts for twenty-four hours after tasting the fruit.

Var. LUZONIENSIS var. nov.

A typo differt foliis minoribus, 4 ad 6 cm longis, membranaceis, in partibus $\frac{3}{4}$ superioribus sensim angustatis, longe acuminatis, basi late cordatis vel truncatis.

LUZON, Province of Rizal, Bosoboso, *For. Bur. 3317 Ahern's collector,* September, *Bur. Sci. 4576, 13613* (type) *Ramos,* August; San Mateo, *For. Bur. 1840 Ahern's collector,* September.

This form is very different in appearance from the material I have above referred to *Cissus repens* Lam., and is not at all like Rheede's figure, the type of *Cissus repens* Lam., in leaf-form. It is much more slender than is the Philippine form of *Cissus repens* Lam., does not show a tendency to break in drying and has smaller, thinner, differently shaped leaves, more or less gradually narrowed from the lower one-fourth to the rather slenderly acuminate apex. When mature fruits are known it may be found better to treat it as a distinct species.

COLUMELLA Loureiro

(*Cayratia* Juss., *Cissus* § *Cayratia* Planch.)

In the year 1911 Doctor F. Gagnepain [2] in connection with his studies on the *Vitaceae* of Indo-China, came to the conclusion that *Cayratia,* as characterized by Jussieu in 1823, constitutes a valid genus distinct from *Cissus.* He accordingly adopted Jussieu's generic name, and considered under it sixteen species, most of which had been described by previous authors

[2] Un genre méconnu: classification des *Cissus* et *Cayratia.* Not. Syst. 1 (1911) 339–362.

under *Vitis* and *Cissus*. After considerable study of the Philippine forms, and such Indo-Malayan representatives of the genera *Vitis, Cissus, Cayratia,* and *Tetrastigma* as are available here, I have very definitely concluded that Gagnepain's position regarding the validity of *Cayratia* as a distinct genus is entirely justifiable, and that it is just as distinct from *Vitis* and *Cissus* as are, for instance, *Tetrastigma, Ampelopsis,* and *Ampelocissus*.

As to the validity of the name *Cayratia,* however, there is a distinct cause for disagreement, at least if we accept literally the rules of nomenclature promulgated by the last two international botanical congresses. The oldest generic name for the group is *Columella* Lour., published in 1790, and typified by *Columella pedata* Lour. (*Vitis pedata* Wall., *Cissus pedata* Lam., *Cayratia pedata* Juss.), which extends from India and Ceylon to Indo-China and Java. It is distinctly unfortunate, however, that the adoption of *Columella* of Loureiro must invalidate *Columellia* Ruiz & Pavon, 1794, a genus that has been universally recognized since its publication, and which typifies the family *Columelliaceae*. However, this case is not covered by the lists of *nomina conservanda* adopted by the Vienna and the Brussels Botanical Congresses, and a strict interpretation of the rules adopted by those congresses will necessitate the adoption of Loureiro's generic name *Columella* in place of Jussieu's name *Cayratia*. In order that this case may be brought to the attention of future congresses, and that *Columella* of Loureiro may definitely be abandoned in favor of *Cayratia,* which should be included in the list of *nomina conservanda* if any generic name is so included, I purposely take up the generic name *Columella,* and transfer to it the Philippine species known to me at this time.

COLUMELLA GENICULATA (Blume) comb. nov.

Cissus geniculata Blume Bijdr. (1825) 184.
Cayratia geniculata Gagnep. in Not. Syst. 1 (1911) 345.

This species extends from Indo-China to the Sunda Islands. To it I refer the following Philippine material: LUZON, Province of Nueva Viscaya, *Merrill 219, Bur. Sci. 8219 Ramos:* Province of Batangas, *Cuzner 25:* Province of Pampanga, *Bolster 22:* Province of Laguna, *Alberto s. n., For. Bur. 21310 Foxworthy & Catalan, Gates 5751, Bur. Sci. 14975 Ramos:* Province of Bulacan, *Bur. Sci. 21721 Ramos:* Province of Pangasinan, *Bur. Sci. 18310 Otanes.*

The material here referred to *Columella geniculata* is characterized by being rather softly pubescent, with long petioles, rather long petiolules and inflorescences, the latter about one-half as long as the petioles. The material agrees closely with the published descriptions, and Planchon has

credited the species to Luzon on the basis of *Cuming 513* from Laguna Province. Blume's original description, however, as well as Planchon's later one, is incomplete and unsatisfactory. The specimens cited above appear to fall under *Cayratia geniculata* as keyed out by Gagnepain, and are apparently close to the form designated by Blume as the variety *mollis*.

Doctor Gagnepain credits to the Philippines the closely allied *Cayratia mollissima* Gagnep. (*Cissus mollissima* Planch.), the references being to specimens collected by *Baume*, near Manila, and by *Perrottet*, from Zamboanga, Mindanao. I have seen no Philippine material that I consider referable to this species, and I suspect that flowering specimens of the form I have referred to *Columella geniculata* may match the Philippine material referred by Gagnepain to *Cayratia mollissima*. The latter species is distinguished by its large fruits and large seeds, and I have no Philippine material that agrees with the species, as described, in these characters. In fruit and seed characters the material cited above agrees with *Columella geniculata*, not with *Cayratia mollissima* Gagnep.

Var. SARCOCARPA var. nov.

A species differt subtus foliis ad costa ramulis petiolisque parce ciliatis haud molliter pubescentibus, foliolis lateralibus basi rotundatis vel obtusis vix cordatis vel subcordatis nervis reticulisque prominentibus.

LUZON, Province of Bataan, Lamao River, *Merrill 2531* (type), June, 1903, *For. Bur. 19136 Curran*, December, 1909, *For. Bur. 1786 Borden*, August, 1904, *Elmer 6700*, November, 1904: Province of Laguna, San Antonio, *Bur. Sci. 10951 Ramos*, August, 1910. MINDORO, Baco River, *Merrill 993*, April, 1903.

This form may ultimately prove to be worthy of specific rank, but as there is some doubt in my mind as to the correctness of my present interpretation of *Columella geniculata*, I have considered it expedient to indicate the present form merely as a variety. In aspect, pubescence, the much more prominent veins and reticulations, and somewhat in the shape of its leaflets it is decidedly different from the form I have referred to *Columella geniculata*, although in floral characters it closely approaches that species. The fruits when fresh are soft, fleshy, somewhat watery, pink, globose, and about 1.5 cm in diameter, shrinking much in drying. It occurs in thickets and in forests along streams at low altitudes.

COLUMELLA CORNICULATA (Benth.) comb. nov.

Vitis corniculata Benth. Fl. Hongk. (1861) 54.
Cissus corniculata Planch. in DC. Monog. Phan. 5 (1887) 563.
Cayratia corniculata Gagnep. in Not. Syst. 1 (1911) 347.

LUZON, Province of Bataan, Lamao River, *Merrill 2535, 7206*, June, 1903, March, 1911, with flowers and fruit, *Whitford 23*, April, 1904, with fruit only, *For. Bur. 19155 Curran*, December, 1909, with flowers and fruit, *For. Bur. 2170 Meyer*, with flowers and fruit, *Williams 25*, with fruit, *Elmer 6672*, with fruit: Province of Tayabas, Lucban, *Elmer 7207*, with flowers: Province of Laguna, San Antonio, *Bur. Sci. 10935 Ramos*, August, 1910: Province of Albay, *For. Bur. 12389 Curran*, June, 1908, with buds and fruit.

This species has previously been reported only from Hongkong and southern China, and most of the specimens cited above have here been determined as *Cissus japonica* Willd. In fact Gagnepain, conforming with this identification, recently cited *Whitford 23*, fruiting specimen only, under Willdenow's species. An examination of the material in all stages, however, shows that the petals are very prominently corniculate, and the anthers are not longer than broad, so that the material cannot be referred to *Cissus japonica*. In all essential characters the Philippine specimens appear to agree with *Cissus corniculata* Planch., and with a single Hongkong specimen, *Hongkong Bot. Gard. 1982*, April 22, 1904, in the herbarium of the Bureau of Science. This latter specimen has somewhat narrower, differently shaped, and fewer-nerved leaflets than has the Philippine material, and comparison of a full series of specimens may show sufficiently constant characters to warrant the later separation of the Philippine plant as a distinct species. At any rate our material cited above represents a form as distinct from *Cissus japonica* Willd., as is the Hongkong (typical) *Cissus corniculata* Planch.

COLUMELLA TENUIFOLIA (Heyne) comb. nov.

Cissus tenuifolia Heyne in Wall. Cat. (1831) no. 6022; Planch. in DC. Monog. Phan. 5 (1887) 563.
Vitis tenuifolia W. & A. Prodr. (1834) 129.
Cayratia tenuifolia Gagnep. in Not. Syst. 1 (1911) 348.

BATANES ISLANDS, Batan, *Bur. Sci. 3702 Fénix*, June, 1907. LUZON, Province of Tayabas, Casiguran, *Bur. Sci. 3110 Mearns*. BASILAN, *Hallier s. n.*, January, 1904.

The specimens cited above previously have been referred to *Cissus japonica* Willd., but following Gagnepain's recent arrangement of the species of *Cayratia* they can hardly represent Willdenow's species, as the anthers are orbicular or suborbicular. The Philippine specimens cited above certainly represent the same species as *Callery 93*, and *Bodinier 2290*, in our herbarium, both cited by Gagnepain under *Cayratia tenuifolia* Gagnep.

India to southern China and Formosa, southward to Indo-China and the Andaman Islands.

I have seen no Philippine material that I consider to be referable to *Cayratia japonica* (Willd.) Gagnep. In the present paper most of the specimens previously so named are referred to *Columella corniculata* (Benth.) Merr., and the remaining material to the present species.

COLUMELLA TRIFOLIA (Linn.) comb. nov.

Vitis trifolia Linn. Sp. Pl. (1753) 293.
Cissus carnosa Lam. Encycl. 1 (1783) 31.
Cissus trifolia K. Sch. Fl. Kaiser Wilhelmsl. (1889) 71.
Cayratia carnosa Gagnep. in Not. Syst. 1 (1911) 347.

This species is common and widely distributed in the Philippines, being found throughout the Archipelago at low altitudes in the settled areas. India to China and southward to tropical Australia.

COLUMELLA PEDATA Lour. Fl. Cochinch. (1790) 85.

Cissus pedata Lam. Encycl. 1 (1783) 31.
Cayratia pedata Juss. in Dict. Class. Hist. Nat. 4 (1823) 136.

LUZON, Province of Rizal, Pantay, *Bur. Sci. 13628 Ramos*, August, 1911.

This species is the type of the genus *Columella* of Loureiro, and extends from India and Ceylon to Indo-China and Java.

COLUMELLA PTERITA sp. nov.

Scandens, glabra, ramulis ramulisque herbaceis alato-hexagonis; foliis pedatim 7-foliolatis, petiolulo medio unifoliolato, lateralibus 3-foliolatis, foliolis membranaceis, grosse apiculato-serratis, longe tenuiter acuminatis, usque ad 9 cm longis; seminibus 4, faceibus ventralibus 2.

Scandent, glabrous in all parts, the branches somewhat fleshy when fresh, 6-angled, narrowly winged down each angle, the wings about 1 mm wide. Tendrils slender, forked, up to 30 cm in length. Leaves pedately 7-foliolate, their petioles 3 to 6 cm long; leaflets membranaceous, glabrous, ovate-lanceolate, the base acute, the apex long and slenderly acuminate, the margins coarsely serrate, the teeth apiculate, 7 to 9 cm long, 2 to 3.5 cm wide; petiolule of the middle leaflet 1 to 1.5 cm long, the common ones of the three lateral leaflets somewhat shorter, the petiolules proper of the lateral leaflets 5 mm long or less. Cymes rather lax, leaf-opposed or subterminal, about 12 cm long including the peduncle. Flowers greenish-white, 4-merous. Calyx truncate. Petals 4, 2 mm long, somewhat cucullate at the apex, obtuse, not at all corniculate. Fruit subglobose, about 1 cm in diameter, 4-seeded, the seeds trigonous, about 5 mm long (immature), the angles sharp, the faces somewhat rugose, the albumen in the form of the letter T in cross section.

UBIAN ISLAND, Sulu Archipelago, *Merrill 5388*, October 12, 1906, in thickets back of the beach, distributed as *Cissus alata*.

Similar to and manifestly allied to *Cayratia japonica* (Willd.) Gagnep., but distinguished from this and allied forms by its 7-foliolate leaves.

COLUMELLA SIMPLICIFOLIA sp. nov.

Frutex scandens, glaber, ramis ramulisque teretibus; foliis 1-foliolatis, petiolo 3 ad 4 cm longo, foliolis coriaceis, ovatis ad late ovato-ellipticis, usque ad 10 cm longis, acuminatis, basi late rotundatis, margine distanter crenulato-serrulatis, nervis utrinque circiter 7, tenuibus, indistinctis vel subobsoletis, reticulis obsoletis; inflorescentiis axillaribus, 5 ad 7 cm longis, floribus ut videtur in ramulis ultimis umbellatim dispositis; fructibus carnosis, ellipsoideis ad obovoideis.

A scandent glabrous vine, the branches and branchlets terete, glabrous, brownish when dry. Leaves reduced to a single leaflet, the petioles 3 to 4 cm long, the leaflet coriaceous, very brittle when dry, ovate to broadly ovate-elliptic, 7 to 10 cm long, 3.5

to 6 cm wide, narrowed above to the rather prominently acuminate apex, the acumen blunt, the base broadly rounded, often slightly inequilateral, margins distantly crenulate-serrulate in the upper two-thirds, the basal part entire, of about the same color on both surfaces when dry, rather pale, not shining; lateral nerves about 7 on each side of the midrib, slender, obscure or subobsolete, the reticulations obsolete. Tendrils slender, 7 cm long or less. Inflorescence axillary, solitary, 5 to 7 cm long, rather narrow, the primary branches 1.5 cm long or less. Flowers not known, apparently umbellate on the ultimate branchlets. Fruit, very immature, ellipsoid to obovoid, very fleshy, 5 to 8 mm long (apparently larger when mature), crowned by the remains of the style.

LEYTE, mountains back of Dagami, *Bur. Sci. 15308 Ramos*, August 5, 1912, in forests.

A species, although known from imperfect material, young fruits only being available, manifestly belonging in this genus. It is well characterized by its unifoliolate leaves, the single leaflets very greatly resembling the leaflets of a number of species of *Tetrastigma*. It was at first thought that the present species was referable to *Tetrastigma*, but the remains of the style and stigma on the young fruits shows no indications of the *Tetrastigma*-character, being quite entire.

TETRASTIGMA Planchon

TETRASTIGMA HARMANDII Planch in DC. Monog. Phan. 5 (1887) 435; Gagnep. in Not. Syst. 1 (1910) 320.

Tetrastima strumarum Gagnep. l. c. *321*, p. p., *quoad Merrill 3258*.

LUZON, Province of Tarlac, *Bur. Sci. 7798 Ramos*, April, 1909, in flower: Province of Tarlac, *For. Bur. 5169 Curran*, September, 1906, in fruit: Manila, *Philippine Pl. 778 Merrill*, March, 1911, in flower: Province of Bataan, Lamao River, Mount Mariveles, *Williams 383*, December, 1903, *Whitford 16*, April, 1904, in flower, *Merrill 3258*, October, 1903, in fruit, *For. Bur. 2061 Borden*, October, 1904, in fruit: Province of Rizal, Bosoboso, *For. Bur. 1855, 3194 Ahern's collector*, September, 1904, July, 1905, in fruit; Antipolo, *Merrill 1740*, March, 1903, in flower: Province of Laguna, Calauan, *Bur. Sci. 12359 McGregor*, December, 1910, in fruit; Los Baños, *Hallier*, December, 1903, sterile; Province of Tayabas, Sariaya, *Whitford 578*, August, 1904, in fruit.

This species is known to the Tagalogs as *ayo* or *ayu*, and is the one described by Blanco as *Vitis pedata* Fl. Filip. (1837) 71, ed. 2 (1845) 52 (non Linn.). The fruits are globose, russet-brown when mature, the pulp colorless or cream-colored, very juicy, acid or nearly tasteless, edible, and are eaten by the natives with fish. According to Mr. Borden's notes the fleshy leaves are also eaten by the natives.

Doctor Gagnepain[1] has referred *Merrill 3258*, fruiting specimen, to *Tetrastigma strumarum* (Planch.) Gagnep., and on the preceding page

[1] Not. Syst. 1 (1910) 321.

Whitford 16, flowering specimen, to *T. harmandii* Planch. He says: "Je ne puis séparer de *T. Harmandii* les échantillons suivants des Philippines: Luzon central, Manille, Balic-balic, n° 356 [*Loher*]; prov. de Bataan, monts Mariveles, n° 16 [*Whitford*]." There is absolutely no doubt but that *Merrill 3258*, October, is identical with, and is the fruiting stage of, *Whitford 16*, April, from the same locality, altitude, and habitat, and that Gagnepain was in error in referring the two to different species. The Philippine material appears to me to be referable to *Tetrastigma harmandii* Planch., rather than to *T. strumarum* (Planch.) Gagnep., and so far as the specimens are comparable, agrees with *Thorel 1345* from Chochin China, in the herbarium of the Bureau of Science.

The species is not uncommon in thickets on the low dry hills about Manila, and is now occasionally found in cultivation for the purpose of covering walls, shading porches, etc. Most of the specimens cited above have been determined, and the duplicates distributed, as *Tetrastigma lanceolarium* Planch.

TETRASTIGMA PAPILLOSUM (Blume) Planch. in DC. Monog. Phan. 5 (1887) 429; Gagnep. in Not. Syst. 1 (1910) 317.

Cissus papillosa Blume Bijdr. (1825) 183.

Cissus suberosa Elm. Leafl. Philip. Bot. 2 (1908) 493.

LUZON, Province of Rizal, Oriud, *Loher 5831*, August, 1905, ♂ flowers. NEGROS, Cuernos Mountains, *Elmer 9500*, March, 1908 (type number of *Cissus suberosa* Elm.). MINDANAO, Lake Lanao, *Mrs. Clemens s. n.*, four collections, September, October, November, 1906, September, 1907, with both flowers and fruits: District of Davao, Mount Apo, *Elmer 11650*, September, 1909.

Java, Borneo, and New Guinea.

This species is well characterized by its papillose branchlets, and is apparently closely allied to *Tetrastigma ramentaceum* Planch., of Cochin China, a cotype of which is in the herbarium of the Bureau of Science. Although I have seen no extra-Philippine material of *Tetrastigma papillosum*, I have no hesitation in reducing to it *Cissus suberosa* Elmer. Mr. Elmer's species is in all respects a *Tetrastigma*, not a *Cissus*, and our material agrees perfectly with the descriptions of Blume's species.

TETRASTIGMA CLEMENTIS sp. nov.

Frutex scandens inflorescentiis exceptis glaber; foliis 3-foliolatis, foliolis chartaceis vel subcoriaceis, subellipticis, utrinque subaequaliter angustatis, basi acutis, apice breviter acuminatis, usque ad 15 cm longis, margine distanter serratis; inflorescentiis densis, brevibus, ferrugineo-pubescentibus, multifloris, breviter pedunculatis, quam petiolo brevioribus; floribus 4-meris, petalis extus pubescentibus, obtusis, ovario pubescente.

A vine, glabrous except the inflorescence, or the younger parts slightly pubescent, the tendrils up to 20 cm in length, the stems and branches terete, brownish when dry. Leaves 3-foliolate, their petioles 3 to 10 cm long; leaflets subelliptic, 9 to 15 cm long, 4.5 to 8 cm wide, subequally narrowed at both ends, the base acute, the apex shortly acuminate, chartaceous or subco-

riaceous, when dry of about the same color on both surfaces, pale or brownish, dull or slightly shining, margins distantly serrate, the teeth mostly small; nerves about 8 on each side of the midrib, the reticulations obscure; petiolules of the lateral leaflets 8 to 10 mm long, of the middle one 2.5 to 4 cm long. Inflorescence axillary, dense, many-flowered, ferruginous or brownish-pubescent, 3 cm long or less, the peduncles usually about 1 cm long, umbellately branched. Female flowers 4-merous, their pedicels short. Calyx shallowly cup-shaped, 1.2 mm in diameter, very obscurely 4-toothed. Petals oblong, obtuse, cucullate, not at all corniculate, uniformly pubescent externally, about 2 mm long. Staminodes slender, dilated at the apex, about 1 mm long. Ovary cylindric-ovoid, uniformly pubescent; stigma sessile, distinctly 4-lobed, about 1 mm in diameter. Male flowers similar, shorter, 4- or 5-merous, the anthers 1 mm long. Fruit not seen.

MINDANAO, Lake Lanao, Camp Keithley, *Mrs. Clemens s. n.*, November, 1906 (type); also from the same locality, *No. 85*, January, 1906, *s. n.*, January, 1907. A specimen with male flowers, November, 1906, is probably the same; this has its leaves 3-foliolate and 1-foliolate on the same branchlet.

A species well characterized by its pubescent petals and ovaries, its 3-foliolate leaves with elliptic leaflets, and its very unequal petiolules, that of the middle leaflet being very much longer than those of the lateral ones. The dense inflorescense which is uniformly brownish or ferruginous-pubescent is also characteristic.

TETRASTIGMA ELLIPTICUM sp. nov.

Frutex scandens, glaber; foliis 3-foliolatis, foliolis ellipticis, coriaceis, in siccitate brunneis, usque ad 13 cm longis, apice acuminatis apiculatisque, base subrotundatis ad subacutis, margine distanter serrulatis; inflorescentiis amplis, ut videtur laxis, circiter 20 cm longis; fructibus anguste obovoideis, circiter 1 cm longis.

A scandent glabrous vine, the branches rather slender, terete, lenticellate, dark-colored when dry. Leaves 3-foliolate, the petioles 4 to 5 cm long, the rachis produced about 3 cm above the insertion of the lateral leaflets; leaflets 3, elliptic, sometimes elliptic-ovate, coriaceous, the smaller ones 6 cm long and 4 cm wide, the larger up to 13 cm long and 7 cm wide, brown when dry, slightly shining, the lower surface a little paler than the upper, the apex prominently and rather slenderly acuminate, the acumen apiculate, base somewhat rounded on subacute, margins distantly denticulate; lateral nerves about 8 on each side of the midrib,

not prominent, the reticulations lax, faint; petiolules 5 to 8 mm long. Inflorescence axillary and terminal, lax, the axillary ones in fruit up to 20 cm long, the terminal ones sometimes 30 cm in length, divaricately branched. Flowers unknown. Fruit narrowly obovoid, about 1 cm long, 5 to 7 mm wide, smooth, narrowed below to the acute base, the apex blunt, tipped by the remains of the stigma, the pericarp thin, brown when dry, showing the rugosities of the seed which is about 8 mm long, slightly compressed, subelliptic in outline.

BASILAN, *Bur. Sci. 16173 Reillo,* September, 1912.

A species greatly resembling *Tetrastigma laxum* Merr., and unquestionably closely allied to that form; different, however, in its much larger leaflets, the rachis of the leaves much extended beyond the lateral leaflets.

TETRASTIGMA EVERETTII sp. nov.

Frutex scandens inflorescentiis exceptis glaber; foliis longe petiolatis, pedatim 5- ad 7-foliolatis, foliolis oblongis ad oblongo-obovatis, usque ad 20 cm longis, acuminatis, basi acutis, margine grosse irregulariter acute sinuato-serratis, nervis utrinque 7 ad 10, curvatis, subtus distinctis; inflorescentiis axillaribus, longe pedunculatis, 2- vel 3-pinnatim umbellatis, pubescentibus; floribus ♂ 4-meris, umbellatis, petalis extus pubescentibus, oblongis, acutis, intus cucullatis, 3.5 ad 4 mm longis.

A scandent vine, glabrous except the inflorescence, the branches terete, striate, dark-brown when dry. Leaves long-petioled, pedately 5- or 7-foliolate, the petioles 13 to 16 cm long, the leaflets oblong to oblong-obovate, 12 to 20 cm long, 4 to 8 cm wide, slightly shining, of about the same color on both surfaces when dry, the base acute, apex sharply acuminate, the margins in the upper two-thirds prominently and coarsely sinuate-serrate, the teeth irregular in size, acute; nerves 6 to 10 on each side of the midrib, distinct beneath, curved, the reticulations subobsolete; petiolule of the middle leaflet up to 4 cm in length, those of the lateral ones much shorter. Inflorescence axillary, pubescent, solitary, 2- or 3-pinnately umbellate, 10 to 12 cm long, the peduncle longer than the floriferous portion, bearing at its apex 3 to 5, elongated, primary branches. Flowers white, 4-merous, umbellately arranged at the tips of the ultimate branchlets, their pedicels pubescent, 5 to 8 mm long. Calyx disklike, truncate, 1.2 mm in diameter. Petals 4, oblong-ovate, acute or obtuse, prominently cucullate at the apex inside, 3.5 to 4 mm long, not at all corniculate. Disk prominent in the staminate flowers, glabrous, 2 mm in diameter. Filaments 2 mm long; anthers orbicular-elliptic, 1 mm long. Female flowers nor seen.

NEGROS, Barlin, *For. Bur. 11217 Everett*, April 21, 1908, reaching the tops of tall trees, growing at an altitude of about 90 meters, locally known as *lañgiñgi*.

Well characterized by its ample, long-petioled, pedately 5- or 7-foliolate leaves, its coarsely sinuate-serrate leaflets, its long-peduncled, pubescent inflorescence, and its relatively large flowers. It resembles *Tetrastigma magnum* Merr., of Luzon, but differs, among other characters, in its pubescent inflorescence.

TETRASTIGMA LAXUM sp. nov.

Frutex glaber scandens, ramis ramulisque teretibus; foliis palmatim 3-foliolatis, foliolis coriaceis, in siccitate brunneis, ellipticis vel ovato-ellipticis, 4 ad 7 cm longis, utrinque subaequaliter angustatis, basi acutis, apice acute acuminatis apiculatisque, margine supra denticulatis; inflorescentiis oppositifoliis, laxis, circiter 10 cm longis, longe pedunculatis, divaricato ramosis; floribus ♂ 4-meris, in ramulis ultimis umbellatis, petalis glabris, 2 mm longis, apiculato-acuminatis.

A scandent, entirely glabrous vine reaching a length of 20 m and a diameter of 12 cm, the branches and branchlets slender, terete, brown, the branches sparingly lenticellate. Tendrils not seen. Leaves palmately 3-foliolate, their petioles 1.5 to 3 cm long; leaflets coriaceous, dark-brown when dry, slightly shining, the lower surface a little paler than the upper, elliptic to ovate-elliptic, subequally narrowed at both ends, 4 to 7 cm long, 1.5 to 3 cm wide, the base acute, the apex rather prominently and sharply acuminate, the acumen apiculate, the margins in the upper one-half distantly and minutely denticulate; lateral nerves 4 or 5 on each side of the midrib, very obscure, the reticulations obsolete; petiolules 6 to 15 mm long, those of the lateral leaflets usually shorter than that of the middle one. Inflorescence slender, axillary, about 10 cm long, often wider than long, slenderly peduncled, divaricately branched above the middle, lax, many-flowered, the flowers umbellately disposed on the ultimate branchlets, 3 to 5 in each umbel, their pedicels 2 to 3 mm long. Male flowers: Calyx subtruncate or obscurely 4-toothed; petals 4, spreading, oblong, 2 mm long, distinctly cuculate at the apex, quite glabrous, not corniculate, but the apex apiculate-acuminate; filaments slender, 1 mm long; anthers about 0.2 mm long, broader than long; disk prominent, glabrous, obscurely 4-lobed. Female flowers and fruits not seen.

LUZON, Province of Bataan, Lamao River, *For. Bur. 2495 Borden* (type), *For. Bur. 2510 Meyer*, January, 1905, climbing on large trees in dry forests and thickets, altitude 30 to 60 meters; the flowers fragrant, pale-green.

A species well characterized by its 3-foliolate leaves, the leaflets dark-

brown when dry, coriaceous; its lax, long-peduncled panicles; and its apiculate petals. It appears to be allied to *Tetrastigma brunneum* Merr., but has entirely different male flowers.

A third species with its leaves consistently dark brown when dry is represented by fruiting specimens from Benguet Subprovince, *Elmer 5976*, with immature fruits, and *Bur. Sci. 13512 Ramos*, with mature fruits. It may prove to be the same as the species just described, but it appears to be different, and has 3- to 5-foliolate leaves.

TETRASTIGMA LITTORALE sp. nov.

Frutex scandens inflorescentiis exceptis glaber, ramis teretibus; foliis pedatim 7-foliolatis, foliolis ellipticis vel ovato-ellipticis, coriaceis, usque ad 15 cm longis, in siccitate pallidis, abrupte brevissime acuminatis, basi acutis vel rotundatis, nervis utrinque 5 vel 6; inflorescentiis axillaribus, leviter pubescentibus, 3- vel 4-pinnatim umbellato-corymbosis; floribus 4-meris, petalis oblongo-ovatis, acutis, vix corniculatis, supra extus parce pubescentibus; ovario glabro.

A vine 10 to 15 m in length, glabrous except the inflorescence, the branches brownish, terete, more or less lenticellate. Leaves pedately 7-foliolate, the petioles stout, 5 to 6 cm long, the middle leaflet larger than the lateral ones, its petiolule 3 to 4 cm long, the common petiolule of the three lateral leaflets 1.5 to 2.5 cm in length, the petiolules proper 5 to 15 mm long; leaflets subcoriaceous or coriaceous, rather pale when dry, of the same color on both surfaces and dull or slightly shining, elliptic to ovate-elliptic, 8 to 15 cm long, 4.5 to 9 cm wide, the middle one larger than the others which gradually decrease in size outward, abruptly and shortly acumnate, the base acute or rounded, of the lateral ones somewhat inequilateral, the margin more or less recurved, distantly and irregularly serrate-crenate; nerves 5 or 6 on each side of the midrib, curved, the reticulations lax, obscure. Inflorescence axillary, peduncled, solitary, about as long as the petioles, sparingly pubescent with scattered hairs, the peduncle 1.5 to 2 cm long, bearing about 4 umbellately arranged primary branches of about the same length as the peduncle, these again umbellately branched, the ultimate branchlets with from 10 to 15 umbellately arranged flowers, their pedicels pubescent, 3 to 4 mm long. Pistillate flowers greenish-white, 4-merous. Calyx very obscurely and broadly lobed, or truncate. Petals 4, oblong-ovate, acute, 2.5 to 2.8 mm long, free, reflexed in anthesis, neither cucullate nor spurred, below glabrous, near the apex sparingly pubescent. Staminodes slender, 1.5 mm long. Ovary ovoid, glabrous, more or less narrowed upward but not attenuate, about 1.5 mm long; stigma

sessile, disklike, obscurely and shallowly 4-lobed. Fruit (immature green, ovoid to ellipsoid, about 1 cm long.

PALAWAN, Ulugan Bay, sprawling over trees along the seashore, *Merrill 7215*, September 19, 1910.

Apparently closely allied to *Tetrastigma lanaceolarium* Planch., but distinguished by its 7-foliolate leaves, and its very differently shaped, relatively broad leaflets.

TETRASTIGMA MAGNUM sp. nov.

Frutex scandens glaber; foliis pedatim 7-foliolatis, longe petiolatis, foliolis oblongis vel elliptico-oblongis, chartaceis, usque ad 18 cm longis, subcaudato-acuminatis, margine grosse irregulariter sinuato-serratis vel serrato-lobatis, nervis utrinque 12 ad 15, distinctis; inflorescentiis oppositifoliis, amplis, usque ad 15 cm longis, laxis, subumbellato-cymosis; fructibus immaturis obovoideis, 6 mm longis.

A large, coarse, scandent vine, quite glabrous, the branches terete, striate when dry, usually olivaceous, sparingly lenticellate. Tendrils 20 to 30 cm in length. Leaves large, pedately 7-foliolate, their petioles stout, 8 to 12 cm long; leaflets chartaceous, brownish-olivaceous when dry, shining, oblong to elliptic-oblong, 10 to 18 cm long, 4 to 7 cm wide, the middle one usually somewhat larger than the outermost lateral ones, base acute, apex rather shortly, abruptly, subcaudate acuminate, margins very coarsely and irregularly sinuate-serrate or serrate-lobed, the teeth sharp; nerves rather prominent on the lower surface, 12 to 15 on each side of the midrib; petiolule of the middle leaflet up to 5 cm long, the common ones of the 3 lateral leaflets about 3 cm long, their petiolules proper 1 to 1.5 cm long, of the outermost shorter than the inner ones. Inflorescence leaf-opposed, lax, ample, about 15 cm long, peduncled, at first dichotomously branched, then umbellately branched, the flowers umbellately arranged on the ultimate branchlets. Flowers 4-merous. Calyx truncate. Petals not seen. Ovary ovoid, glabrous, the stigma sessile, distinctly 4-lobed, the lobes about as long as wide. Fruit immature, obovoid, about 8 mm long.

LUZON, Province of Rizal, without definite locality, *Bur. Sci. 13610 Ramos*, August, 1911, in forests.

A species well characterized by its large, pedately 7-foliolate, long-petioled leaves; its rather prominently nerved, very coarsely toothed leaves; and its ample, lax inflorescence, which is about 15 cm in length and about as wide as long.

TETRASTIGMA ROBINSONII sp. nov.

Frutex scandens inflorescentiis exceptis glaber; ramis teretibus, striatis, leviter lenticellato-rugosis; foliis 3-foliolatis,

foliolis oblongo-ovatis, breviter acuminatis, chartaceis, usque ad 18 cm longis, margine distanter denticulato-crenatis; inflorescentiis axillaribus, pubescentibus bipinnatim umbellatis, quam petiolo brevioribus; floribus 4-meris, petalis extus pubescentibus, oblongo-ovatis vel ovatis, obtusis, apice vix corniculatis, haud cucullatis; ovario glabro; stigmatibus sessilibus, 4-lobatis, lobis brevibus.

A scandent shrub, glabrous except the inflorescence. Branches terete, striate, brownish-gray when dry, longitudinally striate, sparingly rugose with prominent lenticels. Tendrils simple, leaf-opposed, 15 cm long or longer. Leaves 3-foliolate, their petioles about 5 cm long; leaflets oblong-ovate, chartaceous, rather pale when dry, of the same color and slightly shining or dull on both surfaces, 11 to 18 cm long, 4.5 to 10 cm wide, the apex shortly acuminate, the base acute or somewhat rounded, the margins distantly denticulate-crenate; nerves 7 to 10 on each side of the midrib, distant, curved, not very prominent, the reticulations lax, obscure; petiolule of the middle leaflet 3 to 3.5 cm long, of the lateral ones about 1 cm long. Inflorescence axillary, peduncled, bipinnately umbellate, pubescent, about 4 cm long, the peduncles solitary or in pairs, 1.5 to 2 cm long, each bearing from 3 to 5 umbellately arranged primary branches 1 to 1.5 cm in length, each primary branch bearing numerous, umbellately arranged flowers, their pedicels 3 to 5 mm in length. Staminate flowers: Calyx disklike, truncate, about 1.5 mm in diameter. Petals 4, ovate to oblong-ovate, uniformly pubescent externally, 2.5 mm long, free, obtuse, not corniculate at the apex and but little cucullate. Staminodes about 1 mm long, slender, spatulate. Ovary ovoid or subglobose, glabrous, not attenuate, apex abruptly rounded, 1.5 mm long; stigma sessile, 4-lobed, the lobes spreading, short, about as long as wide.

POLILLO, *Bur. Sci. 10400 McGregor*, October 18, 1909, flowers pale yellow.

Apparently most closely allied to *Tetrastigma quadridens* Pierre of Cochin China, but still very different from that species according to its description.

TETRASTIGMA STENOPHYLLUM sp. nov.

Species *T. loheri* similis et affinis, differt foliolis angustioribus, ovario papilloso.

A tendril-bearing slender vine, glabrous except the inflorescence, the branchlets terete, slender, grayish-brown, sparingly lenticellate. Leaves 3-foliolate, their petioles 1 to 1.5 cm long; leaflets lanceolate, chartaceous, rather pale, of the same color on

both surfaces and slightly shining when dry, acuminate, base acute or somewhat rounded, the margins very distantly and obscurely denticulate or subentire, the middle leaflet longer than the lateral ones, equilateral, 10 to 12 cm long, 2 to 2.5 cm wide, its petiolule as long as the petiole, the lateral leaflets somewhat inequilateral, sometimes slightly falcate, 7 to 10 cm long, their petioles about 3 mm long; lateral nerves about 10, obscure, the reticulations lax, subobsolete. Inflorescence pubescent, 2 to 3 cm long, 2- or 3-pinnately umbellate-corymbose, the flowers umbellately arranged on the ultimate branchlets, their pedicels 1.5 to 2 mm long. Female flowers: Calyx very obscurely lobed or truncate. Petals 4, oblong, obtuse, 2 mm long, free, reflexed in anthesis, pubescent externally, slightly thickened and cucullate at the apex, often with an apical gland but not corniculate. Ovary ovoid, pubescent, 1.5 mm long; stigma sessile, 4-lobed, the lobes stellate, narrowly oblong, 0.4 mm long.

LUZON, Province of La Union, Bauang, *Bur. Sci. 12964 Fénix*, December, 1910, along streams, flowers pink.

A species with quite the general appearance of *Tetrastigma loheri* Gagnep., differing in its pubescent ovaries and stellate stigmas.

TETRASTIGMA LOHERI Gagnep. in Not. Syst. 1 (1910) 265. 323.

Tetrastigma philippinense Merr. in Philip. Journ. Sci. 7 (1912) Bot. 86.

This species is merely enumerated to call attention to the reduction of *Tetrastigma philippinense* Merr. to *T. loheri* Gagnep. Fragments of *Loher 371*, the type of Gagnepain's species, received from Kew and from Dr. Gagnepain, convince me that the form I described as *Tetrastigma philippinense* under the impression that it was a species distinguishable from *T. loheri* Gagnep. in certain floral characters, is really identical with *Tetrastigma loheri*. It is accordingly here reduced.

VITIS Linnaeus

VITIS FLEXUOSA Thunb. in Trans. Linn. Soc. 2 (1793) 103; Planch. in DC. Monog. Phan. 5 (1887) 347; Gagnep. in Mém. Soc. Soc. Hist. Nat. Autun 24 (1911) reprint 28.

LUZON, Benguet Subprovince, Baguio, *Elmer 5880*, March, 1904, with perfect flowers and immature fruits, *Williams 1052*, June, 1904, with mature fruits, *For Bur. 5142 Curran*, August, 1906, with mature fruits, *Bur. Sci. 3371 Mearns*, May, 1907, with male flowers, *Bur. Sci. 13488 Ramos*, May, 1911, with male flowers.

Gagnepain, l. c., has referred *Elmer 5880* to the forma *malaiana* Planch., previously known only from Java, but if the various forms designated by Planchon are to be maintained, there is no reason why Blume's original name, *sylvestris* (sub *Vitis*), should not be retained. Gagnepain notes that the different forms designated by Planchon pass into each other

without well-marked differences. The species extends from Japan and Korea to the Himalayan region southward to southern China, Indo-China, and Java.

Except for the introduced and occasionally cultivated European *Vitis vinifera* L., the above is the only true *Vitis* known from the Philippines.

LEEA Royen ex Linnaeus

LEEA PARVIFOLIOLA sp. nov.

Frutex circiter 3 m altus, inflorescentiis minute puberulis exceptis glaber; foliis decompositis, superioribus circiter 45 cm longis, foliolis numerosis, oblongo-ovatis ad oblongo-lanceolatis, acuminatis, 3 ad 6 cm longis; inflorescentiis amplis, laxis, 15 ad 20 cm in diametro, ramulis ultimis puberulis, ceteris glabris; floribus 5-merous, rubris.

A shrub about 3 m high, nearly glabrous, the younger portions of the inflorescence only puberulent. Leaves about 45 cm long, their petioles hardly dilated at the base, decompound, the lower pinnae about 20 cm in length. Leaflets numerous, membranaceous or chartaceous, slightly shining, the lower surfaces somewhat paler than the upper when dry, oblong-ovate to oblong-lanceolate, 3 to 6 cm long, 1 to 2 cm wide, slenderly acuminate, base acute, margins regularly and rather finely serrate; lateral nerves slender, about 10 on each side of the midrib in larger leaves, fewer in smaller ones; petiolules slender, short, terete or subterete. Inflorescence ample, 20 cm long, in full anthesis 15 to 20 cm wide, peduncled, di- and trichotomously branched, flower-bearing only on the ultimate branchlets, the older parts glabrous, the ultimate branchlets puberulent. Flowers 5-merous, reddish, very numerous, their pedicels puberulent, about 1.5 mm long. Calyx 3 mm in diameter, with 5 very broadly ovate, acute, 1 mm long lobes. Corolla 4 mm long, the free parts of the petals narrowly ovate, tapering gradually to the acute tip, 2 mm long. Tube obovoid, about 2.5 mm in diameter, the lobes oblong, about 1 mm long, prominently retuse. Anthers 1.5 mm long.

MINDANAO, District of Cotabato, Glan, *For. Bur. 14241 Tarrosa*, May 25, 1912, slightly above sea level.

A species well characterized by its numerous, comparatively small leaflets and the retuse lobes to the staminal tube. Its alliance seems to be with *Leea manillensis* Walp., from which, however, it is readily distinguished by the characters given above.

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NATURAL SELECTION AND THE DISPERSAL OF SPECIES

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We all cherish and esteem the truth. Those of us engaged in educational work and in scientific pursuits are devoted to the discovery, understanding, and promulgation of the truth, but our effectiveness in this work is somewhat qualified by individual and general peculiarities of mental equipment. Aside from the individual extremes of attitude, such as, on the one hand, that of the man who has such confidence in the stability of the truth that he trusts it to rise triumphant after every assault, and, on the other hand, that of the miser who treats it as one famous miser did his cheese, as something too precious to be exposed to the light, there is a very general disposition, based on the common love of novelty and contempt for the familiar, to value truth in proportion as it is unknown, unfamiliar, or unaccepted. The bizarre always attracts attention. Nobody publishes the fact that two equal two, or that two plus two equal four; and the demonstration that the square on the hypothenuse is equal to the sum of the squares on the other two sides of a right-angled triangle would attract no attention and is only published in elementary geometries. On the other hand, a plausible argument against the last proposition would be published and widely circulated and would attract considerable attention, even if it were not believed. No one pays any attention to the accepted fact that parallel lines will not meet, but a geometry based on the assumption that they will meet is widely heralded.

The general principle of natural selection has been accepted as an established fact for the past fifty years, and for twenty or

thirty years it has been accepted as truth so definitely established and generally accepted that any evidence, that is subject to construction as impairing its validity, attracts an undue amount of attention for this reason alone, and is likely to be accepted by those to whom the novel appeals with special force, and by others who may have escaped thorough grounding in the evidence for natural selection. The latter class is a larger one than it was some time ago, because the practically universal acceptance of natural selection has seemed to make unnecessary the presentation of evidence for it with the thoroughness that was customary when it was a subject of dispute, or while it also made an appeal on the basis of novelty. As examples of ideas that have made their appeal largely on the basis of their assumed value as evidence against natural selection, there may be mentioned the determinate variation heresy based on geological evidence, and the mutation idea, when extended beyond its author's intention and construed as having any relation to the validity of the natural-selection principle.

In general, such attacks attract little or no attention from those whose belief in natural selection is thoroughly grounded, for the reason that the iteration of familiar truth is not always welcomed, and that in general, any argument against a principle that seems to those who appreciate it to be absolutely unassailable, seems hardly worth replying to. In spite of these two ideas, it seems to me that, for the sake of economy itself, it is occasionally worth while to defend a principle even as widely accepted as that of natural selection, for the simple reason that intelligent but unqualified acceptance of really fundamental principles is always conducive to the efficiency of investigation, and that if scientific heresy be too completely ignored, the weakening of real scientific foundations may reach a troublesome point. Therefore, at the risk of placing myself in the unpopular position of an Aristides, I expressed myself publicly regarding the unreasonable application of the mutation theory, while it was new. Too little attention to this and other similar publications about the same time and the continued entertainment of the novelty of an idea that could be entertained as in opposition to natural selection have let the errors grow and have recently justified the publication of more careful and extensive work in contradiction of the same kind.

There comes now Dr. John C. Willis, who, as an excellent botanist, has accumulated a mass of throughly established and very interesting information—valuable if properly construed as collateral evidence on the general principle of natural selection,

but which he construes as opposed to this principle.[1] This evidence has been published from time to time, always with the implication which seems to me to be clearly a mistake, until it seems to be well worth while to point out that this mass of information has its value in the field of science that has its basic principle in the doctrine of natural selection, but has no value whatever in opposition to this doctrine.

Doctor Willis's early attacks on the theory of natural selection were devoted primarily to the support of the mutation theory and its application to questions of survival. In making the facts then at his disposal seem to invalidate the theory of natural selection, he made demands upon the theory that seem to me quite unfair, and then proposed that the theory be discarded, because its supporters could not meet these demands. For example, in the Annals of the Paradeniya Royal Botanic Gardens, volume IV, page 3, we find (italics mine) :

> Now, upon the theory of natural selection of infinitesimal variations, it is evident that any structure whatsoever must be *capable of being shown* to be or to have been—
>
> (1) Of some actual use now; or
> (2) Of some use in the past, in its present or in a different, and perhaps larger (less aborted) form; or
> (3) Correlated with some useful structure, whether visible or not.

I will agree that, upon the theory of natural selection, any structure must be of use, have been of use, or be present as a result of correlation. Perhaps, if it be of use, it is capable of being shown to be of use. But by whom? To demand that any particular person or any one generation explain the uses of all structures is to demand omniscience. It is no more the fault of the theory than it is of the structure, if its interpretation escape us. I believe that the use of the great majority of

[1] 1. Some evidence against the theory of the origin of species by natural selection, etc. *Ann. Roy. Bot. Gardens Peradeniya* 4 (1907) 1–15.
2. Further evidence against the origin of species by infinitesimal variations. *Ibid.* 17–19.
3. The geographical distribution of the Dilleniaceae, etc., *Ibid.* 69–77.
4. The floras of hill tops in Ceylon. *Ibid.* 4 (1908) 131–138.
5. On the lack of adaptation in the Tristichaceae and Podostemaceae. *Proc. Roy. Soc. London* B. 87 (1914) 532.
6. The origin of the Tristichaceae and Podostemaceae. *Ann. Bot.* 29 (1915) 299.
7. The endemic flora of Ceylon, with reference to geographical distribution and evolution in general. *Phil. Trans. Roy. Soc. London* B. 206 (1915) 307–342.
8. The evolution of species in Ceylon, with reference to the dying out of species. *Ann. Bot.* 30 (1916) 1–23.

familiar structures is understood at the present time. Additional structures are being interpreted in terms of utility from time to time. I can remember when the serrate leaf-margin was apparently a good example of a distinctive structure presumed to be beyond the reach of selection; but, for the past decade, the serrate margin has been understood to be useful under particular conditions and to be correlated in usefulness with other adaptive structures.

Doctor Willis continues to preach mutation in his latest paper, and I would argue at greater length against the application to natural selection of his opinions on mutation, if it were not that he has himself presented with striking clearness a conclusion which does away with any necessity of argument on the subject. In the Philosophical Transactions (pp. 329, 330) he says:

> We have no criterion to go by, by which to affirm that a certain specific difference is "small" and another "large." We have no right to say, for example, that if a leaf of one species is simple and of another compound, this is a larger difference than if one is pinnatifid, the other pinnatipartite. We have not the least idea whether the changes in internal construction of the nucleus necessary to form Jordanian species are in any way different from, or smaller or larger than those necessary to give Linnaean species.

And a little farther along,

> We must simply take account of all definite and hereditary differences, whether we consider them large or small. Every one appears to imply a mutation, but whether some mutations are large and others small, we have no idea, for we do not know in what a mutation really consists.
>
> It seems to me better to adopt the hypothesis that any specific difference may appear at one step, whether it be large or small. But we may go further than this, and claim that even "larger" differences than any we have as yet discussed may also arise at one step. For instance, the endemic Coleus elongatus on the top of Ritigala differs so much from all other Colei in its equally toothed calyx, and raceme-like inflorescence, as well as in other points, that it must probably be regarded as almost, if not quite sub-generically distinct. Yet the whole species is confined to the summit of this one mountain and exists there as about a dozen individuals, a number which can never have been much exceeded, if at all; and it must in all reasonable probability have arisen there at one step.
>
> But even with the formation of a sub-genus the possibilities of single mutations do not cease. * * * The distinction between genus and species is really more or less artificial, depending upon our ideas as to what are large and what are small changes.

With these ideas, I am in most complete accord. As long ago as 1904,[2] I concluded (p. 426) that "Mutations, or discontinuous variations, and the most insignificant of individual variations

[2] The variations of some California plants. *Bot. Gaz.* 38 (1904) 401–426.

are parts of one unbroken series." The distinction between genus and species is certainly artificial. So, likewise, is any attempt to frame a definition of a species by which one may decide what differences are specific, what are varietal, what are Jordanian, and, without prolonged study, what are merely incidental and not hereditary at all. There is no way of distinguishing between big and little specific differences nor between big and little differences that are not specific. Certainly, we may affirm that some differences are big and some others are little; but, between the big and the little ones, nature presents an absolutely continuous series of intermediate differences, which we can surely find, if it is worth our while and we exercise sufficient patience.

In the recent paper which most completely summarizes his views,[3] and which presents facts and methods of presentation of such value that they deserve careful attention, Doctor Willis places in apparent opposition to the theory of natural selection, the theory that the commonness of species and the distribution of species is a function of their age.

In the Flora of Ceylon by Trimen and Hooker are notes by Trimen indicating the commonness or distribution of all Angiosperms, except *Gramineae* (for which family Doctor Willis has himself made these notes), by classification into six groups, which in their order are Very Common (VC), Common (C), Rather Common (RC), Rather Rare (RR), Rare (R), and Very Rare (VR). "Very Rare" means very local, and, on the whole, the classification refers more to distribution than to local abundance. Doctor Willis has extracted and tabulated these notes on distribution, in connection with the preparation of his Revised Catalogue of the Indigenous Flowering Plants and Ferns of Ceylon, and the analysis of all these statements is presented with consummate clearness in a series of tables.

In making these analyses, he has classified the indigenous plants of Ceylon under three heads: First: Endemic species; second: Species confined to Ceylon and Peninsular India; and third: Species of wider distribution. His tables show conclusively (p. 311) that:

> "In general the rarest plants in Ceylon are the local endemics, and the commonest those of wide distribution. This is not at all the result that one would expect had the endemics, as is usually supposed, been developed by the aid of natural selection to suit the local conditions." From

[3] Phil. Trans. Roy. Soc. B. 206 (1915) 307–342. Page references not stated to be otherwise are to this paper.

these tables and his discussion, he makes two chief conclusions (p. 320), "The first of which is that the local endemic species have not been—as I have already shown in other ways in other papers—developed in any kind of advantageous response to local conditions, as must have occurred did natural selection obtain." To this conclusion, we will return later.

(p. 325) "The second conclusion that we may, I think, justly draw from the remarkable Tables which have been set out is that, on the average, the commonness of a species depends upon the time that has elapsed from the period it was first evolved in, or arrived in, the country." And again (p. 340), "The second conclusion drawn is that on the average the commonness of a species depends upon its age from the time of its arrival in, or evolution in, the country. The commonness of any individual species will, of course, also depend upon its degree of adaptation to local conditions, and upon many things which can only be regarded as chance, such as the sudden appearance of new factors, like diseases, etc., in the problem. In other words, on the average, species are developed quite indifferently to local conditions, though it is possible that they may be developed because of those conditions."

It is the second of these conclusions which unquestionably follows from the figures that Doctor Willis has collected and so clearly presented. This general idea, that geographical distribution and the age of species are correlated, was explained and used by Doctor Willis in 1907 [Annals of Royal Botanic Gardens, Peredeniya, 4 (1907) 69–76]; and in the paper now under discussion, page 338, he says:

> In 1907 was the first time, to my knowledge, that they were put forward in so many words, and a proper understanding of them will make a great difference in the handling of problems of geographical distribution.

As Doctor Willis notes, "there is nothing surprisingly new about these views." In the preceding year,[4] I had made use of the same views, and had done so without reference to literature, because, as far back as my student days, at least two of my professors explained them to us as commonly accepted principles. In the paper just cited, page 62, I note:

> Even geographical characters are useful. The whole of the character of not a few genera, as *Prosaptia*, *Niphobolus*, and *Acrostichum*, is intelligible when, and only when, the habitat is included and recognized as the dominant character of all. More broadly geographical characters are of value too, for no plant has progeny in places inaccessible to its reproductive structures. The relative antiquity of groups, as definable by their present characters, is important evidence in judging their relationships. If a species or genus is confined to one locality or one part of the world, it is probably not very ancient. If it has a very wide and continuous distribution, its age cannot be less than sufficient to permit such a dissemination. Our oriental *Prosaptia*, *Acrosorus*, *Loxogramme*, "*Schel-*

[4] The comparative ecology of San Ramon Polypodiaceae. *Philip. Journ. Sci.* 2 (1907) *Bot.* 1–76.

lolepis," *Niphobolus, Drynaria, Dryostachyum, Thayeria* and *Lecanopteris,* and the American *Lepicystis, Campyloneuron* and *Phlebodium* must all be younger groups than the cosmopolitan *Polypodium,* ancestor and cousin at once of them all. A group with wide and discontinuous distribution must be ancient enough to have become widely distributed, and to have died out in the intermediate territory; it may not be older than a group with equally wide continuous distribution, but its minimum probable age is greater.

The relation between commonness in one country and distribution outside that country has not been in the past so well appreciated as the relation between age and distribution, but is made equally clear by Doctor Willis's tables. It is unquestionably true that in almost any country such a relation exists, and a little reflection suffices to show that it must in general exist. Without ever putting it into words, I have for years acted on the assumption that there is such a relation. It has repeatedly happened that after describing a species from a single collection, under the impression that it was quite local, and after a reasonably careful search for previous description elsewhere, I have found the plant to be rather common in the Philippines, and have then made a renewed search for previous description from some neighboring land; the idea being exactly that which Doctor Willis has demonstrated to be sound—that a species common and of rather wide distribution in a given island, or group, or region, is therefore to be expected to occur in other islands or regions. Locally extensive distribution and commonness are evidence both of considerable age and of the ability of the species to maintain itself and to spread, and age and the ability to spread are in themselves reasons to consider it likely that the plant has spread extensively.

For the sake of emphasis, I repeat that both *time* and the *ability* to survive and spread are necessary in order that any plant can have become widely disseminated. In the four-year course of our College of Agriculture, some students graduate in three years, some graduate after five years, while the largest number of those who enter the course graduate in four years or disappear without finishing the course. In determining when any student will graduate, time is one paramount factor. There is probably no human being who could finish the course in one or two years; but, because time is a paramount consideration in determining who will graduate during any given year, shall we conclude that ability has nothing to do with it? Surely not. In the case of any given student, the date of graduation is fixed by the date of entrance, by his ability, and by other considerations (sickness or death, for instance); and the fact that time is

indispensable does not in the least impair the fact that fitness is also indispensable. The student uses his time according to his ability, and his fitness for the work of a student becomes effective as time passes.

Now, likewise, in the case of plants, if the plant be without fitness, time avails it nothing. Assuming the plant to exist, but without fitness to endure and to spread, it stands still for a longer or shorter time and finally disappears. The doctrine of natural selection and survival is a rational one; but would not be so, if it ignored time. The fitness of any plant is merely ability to make use of time in which to survive, to spread, and eventually to keep or to become adapted to the conditions under which succeeding ages find it. There could be no sane doctrine of natural selection without consideration of the element of time; and the early fight of the idea of natural selection for general recognition was forced primarily by the necessity of past time for the possibility of the evolution that natural selection postulated.

Now, if we recognize, as I do not see how we can possibly escape doing, that the demonstration of a relation between time and geographic distribution not only does not impair the doctrine of natural selection, but is rather an indispensable and inevitable corollary of the theory of natural selection and a consideration that must be taken into account in the application of the theory of natural selection to the understanding of the bionomics of any single plant or structure, I believe there will remain nothing in this paper by Doctor Willis that consititutes an argument against the doctrine of natural selection or that offers anything but an invitation for the investigation of particular problems in the application of this doctrine.

To some of these applications, I will return presently. First, however, let us note that the difference in view between Doctor Willis and myself lies again in the demand made upon the doctrine of natural selection or, in other words, upon what we mean by this doctrine. To me, the proposition is simply that those plants survive that can—where, when, and while they can. Their presence is obviously necessary before they can begin to survive. To Doctor Willis, the doctrine of natural selection is something which ought to explain the initial presence of the plants. In passage after passage, he recognizes the necessity of fitness for ultimate survival, sometimes without reservation, sometimes with decided qualification for another element classified as chance; thus (p. 341):

"Species do not, so far as we can tell, appear in any sort of advantageous response to local conditions, which are the only conditions that matter when they first appear. Having appeared, a species will, or will not, spread, according to its suitability to local conditions. In each locality the ultimate commonness of a species will depend upon its degree of adaptation to the local conditions, and to a large extent, on chance." And from the paper on the *Dilleniaceae*, "Dillenia ovata was perhaps the first, or the best adapted, for it has spread comparatively widely."

Regarding myself as a confirmed adherent of the doctrine of natural selection, I do not hold it in the slightest measure *directly* responsable for the origin of any species. Species originate by variation. There is not the slightest doubt that in very nearly all cases—if not in quite all cases, the exceptions have never been well demostrated—variation is indiscriminate in direction. Now, if any man chooses to define a mutation as a variation that gives rise to a new specific character, then, certainly, species originate by mutation exclusively. My own objection to this use of words is that they are newer than the ideas they would express, are therefore superfluous, and consequently are a nuisance. There is nothing new in holding that the mutations are independent of natural selection, since the variations have always been held to be so. Doctor Willis maintains that the species originate by mutations which occur independently of fitness. The older idea is that the species, or characteristics, originate by variation, independently of natural selection. Neither the validity nor the scope of the doctrine of natural selection seems to be seriously impaired by the substitution of the novel word. When any man distinguishes a mutation from a variation by a usable definition, it will become possible to see whether the change of words is justified and to test its effects. The author of mutations (de Vries) presented no such definition, unless it be the one already suggested, that a mutation is a variation which produces a specific character; as to the latter, de Vries took us back to the starting point, from which we might wander around the circle *ad libitum,* by identifying specific characters by their origin through mutation. If any subsequent writer has identified mutations more intelligibly, it has escaped me; Doctor Willis, at least, will hardly attempt this, in view of his clear recognition of the inherent hopelessness of attempting to draw any line between small differences and bigger ones, between the measure of incision of a leaf-margin and the characters that are used to distinguish species, genera, and even families.

While the choice of diction as between mutation and variation has properly nothing to do with the recognition of natural selec-

tion, it is genetically associated with the scope of our idea of a species; and approaching the subject from this point, I may come again into agreement with Doctor Willis, and this time on his own ground. There is a constant tendency among both botanists and zoölogists to place an ever finer construction on the idea of a species. Each decade sees the recognition as species of many groups of plants which previously were combined with other groups, either as varieties or without even varietal distinction. In some cases, this change is due to more careful investigation of resemblances and differences, but frequently it is merely the expression of a change in attitude as to what a single species should include. The extreme in this direction was reached years ago by Jordan, in the recognition of what are commonly referred to as Jordanian, in distinction to Linnaean, species. As a matter of fact, no botanist of to-day holds himself to the Linnaean idea. If the present tendency continues unchecked, our descendants will all find themselves following Jordan's policy. In practice, I do not expect the tendency to extend so far. Such a practice applied to all plants would make systematic botany a subject inconveniently vast and cumbersome, even for the larger number of botanists that may be expected in future years. In the case of the very great majority of plants, the recognition of Jordanian species, supposing that they exist, would serve no useful purpose. In the case of such plants as rice, and other plants of great industrial importance, it will be worth while, and will surely be done, whatever the nomenclatorial rank the forms may be given.

Our nomenclatorial divisions—families, genera, species, and varieties or forms—are, as I have repeatedly pointed out, in part functions of the diagnostic peculiarities of plants, and in part functions of our convenience. The old idea, that a species is a group of plants distinct from any other group, in the sense that we know no practically continuous series which connects it or has connected it with any other group, was never anything but an expression of contemporary ignorance, and is as dead to-day as the idea that the species were separate manifestations of the Creator's activity. This is as true of genera and families as it is of species. "We would still want to recognize genera and species, if the tree of life could be reproduced in every detail." [5]

As we fill in our skeleton structure of the tree of life, it is convenience that must determine what genera, species, and other

[5] Philip. Journ. Sci. 8 (1913) Bot. 153.

groups will continue to be recognized. As we fill in the finer details, suppose that we recognize the twigs as species, shall we recognize the leaves as well? The leaves are parts of the whole structure, but are transient in their nature. Eventually, the most of each season's twigs, on each individual tree, also die and fall. Of the species that occupied the world five million years ago, some may survive, but the most have doubtless disappeared. Working in any particular age, as we have the opportunity to work in our own, we may identify each recognized twig of the tree of life as something that for our purposes, extending over a period of generations, is established, and we may give it a specific name. But, again, what shall we do with the leaves, of which each season perhaps yields its own crop?

To my mind, this figure of the tree of life is appropriate and useful. Granted that we retain the finest twigs as species, the leaves are each season's crops of variations. As the morphologists distinguish easily in general between leaf and twig, so the systematic botanists can distinguish in a general way, although with less accuracy and with more difficulty, between the fluctuating variations and the recognized species, which hold their own through the time with which we are acquainted, and are widely scattered. Yet, there is no sharp line between these. Of each season's crops of variations, the most disappear in their turn as regularly as they present themselves; yet of each season's crop, some variations in form perpetuate themselves for a longer or shorter time—some for one more generation, some for several generations, and so on up to what in a practical sense we refer to as "forever." There is no sharp line between the most temporary variations and the most lasting. And in selecting among the plants that manifest these forms of varying distinctness and durability those which we will recognize as species, convenience is the only ultimate criterion that can possibly guide us.

In each locality, each species produces its own crop of varying offspring. In each season, each species that occurs on a number of islands or a number of mountain tops produces in each locality its crops of variants. Some of the variations are so slight as to escape any attention that they might receive. Others, the visiting or resident botanist notices, but ignores as of little importance. Others are more striking. If they impress him as sufficiently marked, he describes a new species. What constitutes sufficient markedness depends on the idea of propriety held by the individual botanist. Visiting one of our mountain tops, Linnaeus would have found a few species; Jordan, a very large

number. Even Linnaeus, if he could have visited all our tropical summits, would certainly have described some species that a visit a few years later would fail to relocate.

For the particular plant forms found at a given time in a given place, natural selection may or may not be responsible. If they have been there for a long time, they must have been fit. But for the plants that appear this season as an expression of indiscriminate variation—usually slight, but with increasing rarity increasingly conspicuous—natural selection is not responsible. If a botanist, visiting a mountain summit, discovers a peculiar plant which he knows has originated in the course of this year's variation and which he knows will disappear with the death of this year's generation, he may or may not describe it as a new species, depending upon his general attitude or his chance humor. It is perfectly possible that he foresee the fate of this "species." Willis states that *Coleus elongatus*, confined to the summit of Ritigala, is represented by not more than a dozen individuals. Unless it is protected by authority, an ambitious collector will some day exterminate this plant, and, in so doing, secure particularly valuable material for sale or exchange. One of the California botanists, some years ago, described a new species and refused absolutely to tell any other botanist where he found it, stating that there were but few plants and it would be exterminated by collection.

In the overwhelming majority of cases, the botanist cannot foresee the extinction or survival of any given rare and local species. He describes what looks distinct enough to appeal to him, as a species, and lets it take its chance. Now, remembering that the striking form which makes its appeal as a species is at the time of its first appearance perhaps nothing but the extreme of a series of other and minor variations, and that it is the individual botanist's judgment which decides how extreme the given variation must be to constitute a species, and that natural selection has, according to old theory, nothing to do with the occurrence of these forms in the first place, it follows that the number of species which exist completely independent of natural selection, so far as their distinctive characters are concerned, depends upon nothing except the judgment of individual botanists. If we were to split so finely and industriously that every variant were given a specific name, then an almost infinite majority of our species would exist independently of natural selection. If it were possible to know the history of each kind of plant and to restrict ourselves to the description

of those distinctive forms that have endured for a long time, and to recognize these, and these only, as species, then natural selection would be responsible for them all.

Obviously, our opportunities, our judgment, and our convenience all combine to make us adopt a middle course. A very considerable proportion of new species are described from single plants. It is far from unheard-of for two species to be described from a single plant. In the groups that vary widely, of which I presume that the genus *Crataegus* is one, it is probably not unusual for more than one species to be described from the progeny of a single plant. Up to this time, such a practice has not been adopted, except in cases where the parentage is unknown. If the same freedom of species-recognition and description were practiced with various cultivated plants, for example, tobacco, where the parentage is known but the offspring vary beyond the bounds that would be recognized as specific among wild plants of unknown parentage, there would be almost no limit to the number of species; but systematic botanists have so far mercifully abstained from doing this.

The responsibility of natural selection for the species recognized at any moment in a given place depends then very largely upon what we recognize as a species. The possible origin of species by the summation or selection of variations, whether slight or great, is another question to which the answer is fixed chiefly by our choice of definitions. In so far as the species originates by a single variation—which may always be true, if we define species in that way—natural selection is never responsible for its immediate appearance. Even if we go as far as the veriest determinate-variationist might, and assume that species N has been derived from the species A, through B, C, D, E, etc., all steps being in the same direction, and the most of the steps being individually short enough to escape our notice, still each of these intermediate forms by the definition just suggested is itself a species, and N, in its turn, originates by one variation from the different parent species M.

That the species which occupy the world to-day have originated by the selective accumulation of relatively small differences, it is not worth the mutationist's while to deny. None of them will waste his time looking for an Angiosperm as the mutant of a Flagellate, nor will any mutationist be disposed to deny that between these extremes there has been a large number of intermediate steps. If we agree with Doctor Willis that the only difference between little steps and big steps is one of degree,

and that even the degree is beyond our power of measurement, the particular number of steps between the Flagellate and the Angiosperm loses all possible importance. We may then agree that, on the one hand, the species that occupy the world to-day are, each and every one of them, products of an exceedingly long series of selected variants or mutants; but, at the same time, we may also all agree that species may be so defined that natural selection is never immediately responsible for their origin.

In conceding that natural selection may not be immediately responsible for the origin of the "species" we may discover, I am not detracting one particle from the claim that it is ultimately responsible for the presence of every plant and for every typical and normal structure of every plant that any man can find anywhere in the world. Among each season's crop of variations, a few may endure because they are particularly fit to endure. These are naturally selected. The vegetation of the world to-day has been selected, and reselected, countless times, out of the crops of each season of past time. Though we may define a species in such a way that natural selection is not this year responsible for the majority of the species on any particular mountain top, there is no mountain top where it is not responsible for practically the whole of the vegetation—responsible for its particular form as well as for its presence. By defining species in a way that removes a large part of them from the scope of immediately past selection, we leave the vegetation of the world made up—as it actually is—almost entirely of a small minority of all species. For the vegetation of the world in every conspicuous aspect and attribute, natural selection is entirely responsible; and even though we accept definitions that make natural selection not responsible for single specific characters of single small groups of plants, we still leave it responsible for the most of the characters of every individual among these plants, and leave it (natural selection) with entire ultimate responsibility for the presence of each, even of these rare exceptions; for, without the sanction of natural selection, their parents would never have born progeny.

I turn now to a few of the details of Doctor Willis's papers.

Quoting from page 328, "In cases where we get two large and well-defined groups in a family, we may compare their degrees of rarity, when the difference between them is what is usually looked upon as an adaptation. For example, in the Rubiaceae it is usually supposed that the sections with fleshy fruits are more recent than those with dry. But on the other hand the *former* is supposed to be an adaptation to enable the seeds to be easily dispersed." And from page 329, "It is evident that the fleshy fruit has

not proved of any special value to its possessors, and is probably a more recent development. There are many other so-called adaptations in many other families which can be dealt with in the same way. Always the figures go to show that evolution of forms is on the average indifferent, and that these so-called adaptations are of no special advantage to their possessors."

Now, if we agree that the *Rubiaceae* with fleshy fruits are more recent than those with dry fruits, this alone might be responsible for the greater abundance of species with dry fruits, in spite of more perfect adaptation on the part of those with fleshy fruits. In reality, however, this does not hit the kernel of the matter. The fact is that the dry fruit is also an adaptation, just as much as is the fleshy fruit. One is adapted to one set of conditions, the other to another set, and the two sets of conditions may perfectly well be encountered at the same time and in the same place. A perfectly parallel situation is presented by the structure of the pileus of the Agaricales. As Buller has beautifully shown in the Pfeffer Festschrift, most of the species of *Coprinus* have one type of structure and behavior, while *Psalliota* and nearly all of the other *Agaricaceae* have a different type, the two differing in almost all pcssible details, even down to the finest, but both being recognized by Buller as highly and appropriately specialized, the two occurring side by side without the slightest prospect that either will drive the other out.

It is important to each group of plants, for the sake of the completest possible success in holding what place it has and in spreading, that it occupy every available habitat, make use of every available means of dispersal, and make the most of each factor that will insure the reproduction of any of its members. The fact that some *Rubiaceae* are adapted to dispersal by the characters of their dry fruits does not make it at all a disadvantage that related plants of the same family be adapted to the same end by the possession of fleshy fruit. The family is better off with two general methods than it would be with one general method. In each generation, the family as a whole is safer because every possible method is taken advantage of by some of its members. The members that scatter their seeds by the medium of fleshy fruits are, in this respect at least, out of competition with those that scatter their seeds by methods depending upon the dryness of their fruit. To this extent, the family can have more members and be more successful, because in this respect competition within the group is removed.

Years ago, my friend Professor Peirce [6] undertook to argue that the algal constituent of a lichen gained nothing from the association with the fungus, even though it was enabled to live in places, that without this association would be inaccessable or intolerable. To make his point perfectly clear, Professor Peirce makes use of "A homely analogy. A cow would never climb to the top of a twenty-story building, but once elevated to this position in opposition to her ordinary habits and to the force of gravitation, would she be any more advantageously placed than her more commonplace relatives in barn or pasture?" A Chinese student in this college once presented, as a piece of English composition, the story of an imaginary dream, in which he saw the vacant places of the earth occupied from time to time and made productive for the use of men, until every desert was watered and every rock covered with a mantle of soil. The mountains were leveled to an altitude where rice could be produced; and finally even the seas were bridged, and the bridges covered with soil and made to produce their crops of rice.

The Chinese boy's imaginary dream is truer to life than the argument of the wisest professor who overlooks the fact that the one test of fitness, of appropriateness, is survival. As the struggle for food grows keener, the time may indeed be anticipated, when no foot of the Earth's surface can well be spared from producing its portion for our use. That time has not yet come for us; but for the lichen, for the *Rubiaceae*, and for the cow, it is here, and it has been here so long that we can almost say that it always was. The twenty-story building is located where there is no room for cattle in green pastures; and where there are green pastures, there are already as many cattle as men think can thrive upon them. If the roofs of twenty-story buildings could really be made available as places for cattle, then more cattle might exist in each generation; and this, by the one final standard of judgment, would be an advantage to the race of cattle and would assuredly be of advantage to the individual cattle that lived because this peculiar habitat furnished them the opportunity. The algal constituent of lichens grows in places that are fit for it and within reach. If slavery to a fungus increases the number that can live, by furnishing a new place or a means to reach a new habitat, this is to the advantage of the gonidial species, as well as that of the individuals which live because of the opportunity the fungus offers.

[6] Proc. California Acad. Sci. III Bot. 1 (1899) 230.

Likewise, among the *Rubiaceae*, any method of reaching a new habitat is an advantage to the group as a whole, because it is of advantage to the members that acquire the method. Some may be specialized to scatter their seeds by means of the wind, some by floods, some by the use of various quadrupeds, others by the help of birds or even insects; each one of these methods, and each added method that may be developed, is an advantage. The structures adapted to each method or to the employment of a common method under varying conditions all survive and become numerous in the individuals that possess them, because they are advantageous; but it is not to be expected that any one of these will enable the plants that exhibit it to become more numerous than the plants that propagate themselves by some other equally desirable but different method. There are many families that have some members with dry fruits and others with fleshy fruits. Each of these methods is an adaptation to a common and wide range of natural conditions.

Doctor Willis's second paper against individual selection [Annals 4 (1907) 17] is chiefly devoted to the point that—

> While the characters that distinguish species and genera are largely characters of the floral organs, the struggle for existence is almost entirely among the seedlings and young plants, in which these organs are not yet present.

By the same argument, in a government school where expenses of every kind are paid by the state and only the brightest students are selected for promotion, the wealth of the parents cannot be a factor in determining who will graduate. Yet, everybody knows that, in schools of this type, it is often impossible for a poor man's son to graduate, simply because he can never be admitted. Flower and fruit structures surely do not take an active part in the competition between seedlings, but they determine the entries for this competition; and no one will claim that this is likely to be without influence on the result. The struggle between old trees probably is not keen. By the time the tree is grown, the fight is settled, so far as it is concerned, and is carried over to the next generation. The essential struggle of any individual is not to survive in itself but in its progeny. Tennyson knew all about this.

Quoting from page 323 (Philosophical Transactions),

But we may go further yet, and take the two genera, *Doona* and *Stemonoporus*, which have 11 and 15 species respectively, and on the theory of natural selection would therefore be supposed to be especially suitable to the local conditions. They show:

TABLE XIX.

	Doona.	Stemonoporus.
VC	0	0
C	1	0
RC	1	0
RR	2	2
R	4	4
VR	3	9
	11 Marks 51	15 Marks 82
Rarity	4.6	5.4

And page 324,

TABLE XX.

	Number.	Marks.	Rarity.
Species of wide distribution	1,508	4,579	3.0
Species confined to Ceylon and Peninsular India	492	1,714	3.48
Mean rarity of all	.....	.....	3.49
Species endemic to Ceylon	809	3,518	4.3
Species of all 23 endemic genera	52	236	4.5
Species of Doona	11	51	4.6
Species of Stemonoporus	15	82	5.4

Such figures as these no ingenuity can torture into any kind of support for a theory of development of endemics to suit the local conditions.

These figures likewise throw no great light on the multiplication table, but do not therefore impair its validity nor jeopardize its general acceptance. For the understanding of this situation, it is not natural selection nor multiplication, but division, the effects of which need to be understood. There is no question that in the Philippines the commonest timber trees are the lauans, likewise dipterocarps, but there is a considerable number of species of lauans, and individually they are not exceedingly common. As to Ceylon dipterocarps, note the expression[7] "The Dipterocarpaceae, so common in Ceylon * * *." If *Doona* had a single species, it might be very common, and *Stemonoporus* might be common, or very common, if it were monotypic. There are no figures by which to decide how many times "very common" must be divided in order to produce "rare," but any man who has ever seen an apple divided knows that the portions are smaller than the whole. If *Doona* and *Stemonoporus* were as a whole only as common as other genera or as the mean of all Ceylon plants, then the fact that *Doona* is split into eleven species and *Stemonoporus* into fifteen would suffice

[7] Ann. Roy. Bot. Gardens Peradeniya 4 (1907) 18.

in itself to make each of these species a rather rare plant. The effect of this development of numerous species has probably been in each genus to increase the area available, and so the aggregate commonness. But the improvement in this respect cannot be expected to suffice to offset the rareness resulting to the single species from the fact of their considerable number, unless the differences between these single species are such as completely to remove them from competition with one another. This probably never happens in any genus. Therefore, in every genus, the more numerous the species, the greater their individual rarity. "When the genus contains one or two species only, rarity is 4, when it contains more than two it is 4.3" (p. 331). If this rather elementary application of mathematics does not torture the phenomena in question into any kind of support for a theory of advantageous evolution, it certainly leaves nothing that can be construed as in opposition to such theory.

As to the relative rarity of *Doona* and *Stemonoporus*, Doctor Foxworthy points out that *Stemonoporus* is a decidedly isolated group, while *Doona* is closely related to the widespread genera *Hopea* and *Shorea*. If *Stemonoporus* is the rarer, as well as the more isolated morphologically, this is another illustration in support of Doctor Willis's general thesis.

In several places, Doctor Willis notes the general tendency of endemic species to occur in the wet and mountainous districts rather than in the dry. Thus, page 319:

> It is also very noteworthy that in the dry zone there are only 28 endemic species against 743 in the wet, though the species of wide distribution are only in the proportions of 304 to 648, and the dry zone has twice the area of the wet.

There appear to be two valid explanations of this condition. The dry region is closer to the dry region of continental India, and there is, accordingly, a better chance for species to spread across the channel in either direction; that is, the dry region of Ceylon is much less isolated from the continent than is the wet region. A second explanation is that conditions are much more varied in the wet region and that any given set of conditions is much more restricted. If, therefore, a plant varies so as to produce a new species in any given spot in the wet region, its favorable field for dispersal is almost sure to be decidedly circumscribed, as compared with that of a new form adapted to dry-country conditions. High mountains are particularly "local" in their conditions, and, accordingly, in Ceylon, as is true everywhere in the tropics, each mountain of any age has

a considerable endemic flora. What we have here is merely a manifestation of the principle, which various evolutionists have strongly emphasized, that isolation is essential or at least favorable to the establishment of new species. "Isolation, *as isolation,* favours the production of new forms." [8]

Even this does not exhaust the explanations. On the whole, the plants of dry districts are probably more likely to scatter their seed to great distances than the plants of wet districts. Facility for wide dispersal of seed is of course conducive to commonness and inimical to prolonged endemism. And, still again, in a district where there are marked local differences of conditions natural selection tends to permit a wider freedom of variation than it does where conditions are uniform or comparatively uniform over considerable areas.[9] For this reason, variation being more frequent and wider in the more diversified wet region, more new forms, susceptible of recognition as species, are continually appearing there; and the more such forms appear, the more are likely to be perpetuated and to attain recognition.

Doctor Willis is also puzzled by the fact that (p. 319)—

> Adding up all the species of the dry zone, we find 472 confined to it with 1809 marks, or a rarity of 3.8; those of the wet zone only are 1692 with 6497 marks, or also a rarity of 3.8. But the species that occur in both zones, 645 with 1505 marks, are much commoner in both, and show a rarity of 2.3, i. e. are fairly near to the level of "Common." How this result is to be interpreted it is difficult to say.

To this, as to the rarity of numerous species in a single genus, a merely mechanical explanation suggests itself. The commonness of a species being graded according to the number of collections and their remoteness of locality from one another, the fact that collections are possible in both districts must operate to make the plant seem common, even though a plant is rated very common, if sufficiently abundant in the district climatically suitable. The fact, moreover, that a plant can produce seed under a variety of conditions, and have these seed likely to grow likewise under a variety of conditions, gives it, in the struggle for existence, a material handicap over any plant that can thrive only under comparatively restricted conditions; and this handicap, given sufficient time, will inevitably make the more adaptable plant the commoner.

[8] Ann. Roy. Bot. Gardens Peradeniya 4 (1908) 135.
[9] Variation in California plants, p. 413.

One of Doctor Willis's objections to natural selection (p. 321) escapes me completely:

> Natural selection, again, to be effective, requires that many forms shall modify in the same direction. * * * The most numerous group of the Ceylon endemics are these Very Rares, and the numbers decrease steadily up to Very Common. They must obviously have begun at one or other end of the scale. They could not begin at Very Rare (on the theory of natural selection), because the numbers are insufficient.

I do not believe that natural selection, to be effective, requires that many forms shall modify in the same direction. If "modify" means "vary," I am skeptical as to there being any evidence, proving that many forms ever do this in the same direction. Natural selection, to produce a definite species, requires rather that a fit form maintain its advantageous characteristics *without modification,* while the individuals can become numerous and spread. A single isolated individual, well adapted to its location, may surely become the ancestor of a common species. If the theory of natural selection really required that a species could not come into existence at "Very Rare," but must be very common at its first appearance, it would be a strange theory indeed. It is hardly fair to a theory to impute to it quite that measure of absurdity.

On page 340, Doctor Willis says, "One may conclude that the local endemic species have not been developed in any kind of advantageous response to local conditions." More explicitly, on page 15 of the Annals of the Royal Botanic Gardens, volume IV, he says, "It is at least entirely doubtful if any given species is especially adapted for the circumstances in which it is found." This shows how widely men of training and field experience may differ in their views. For, aside from the distinctive features of possible ephemeral species, I do not believe that there is a plant in the world that does not exhibit adaptation in the whole of its structure, nor which, so far as it is restricted to localities by environmental conditions, fails to be specifically adapted to the local conditions under which it thrives. My paper on the Comparative Ecology of San Ramon Polypodiaceae contains hundreds of illustrations of particular adaptions to particular local conditions. It is not merely that water plants and land plants differ, or that plants restricted to the shade differ from those thriving in open sunshine; but that in genus after genus, where the genus has species under varying conditions, the different species differ from one another in ways that specifically adapt them to their distinctive environments.

If Doctor Willis could see *Stenochlaena areolaris* where it thrives, he would surely be convinced that at least this plant is specifically adapted to its peculiar habitat. It is epiphytic on one species of *Pandanus*. Its adaptation to the very peculiar conditions presented by its "substratum" is such that it can grow nowhere else. Geographically, it is restricted, therefore, to the few square miles where *Pandanus utilissimus* occurs. I expect to describe this most extreme case of adaption at greater length. For the point under discussion here, equally valid evidence is presented by thousands of known species of fungi. Almost every species of parasitic fungus has one host species or a single group of host species, which it is able to attack. Is it imaginable (not to ask for a demonstration) that it is anything except specific adaptation of parasite to host—that is, specific adaptation of the fungus plant to its own peculiar environment—that lets the fungus attack its host, but not the infinitely more numerous other plants growing in the neighborhood? Such a question seems to answer itself.

Finally, the last of Doctor Willis's papers, so far published, deals with the dying out of species, and seeks to show that the extermination that must occur, if natural selection operates in the usually supposed manner, does not occur or seems not to be occurring among the plants of Ceylon. The body of the paper is chiefly a restatement of the facts in the more extensive paper in the Philosophical Transactions, the minor attention, given to the question of dying out, earning one paragraph out of eight in the summary. It may be, as Doctor Willis maintains, that his figures do not furnish any reason to suspect species of being on the downward grade. If there are no species dying out in Ceylon, the number of species in the island must be undergoing a constant increase, and, indeed, this is probably happening. Increase in the number of species must result in a decreased average commonness—that is, abundance in individuals—of all species. Otherwise, the number of individuals in Ceylon is increasing and this is not so probable. If no species is driven to the wall, while the average number of individuals of all species decreases, it is rather strange; but it must certainly be expected that, as many new species are introduced or evolved, and some of these become very common, the disappearance of old species will be comparatively slow. In a study of the flora of four towns in southern Wisconsin,[10] in which particular atten-

[10] Shriner and Copeland. Deforestation and creek flow about Monroe, Wisconsin, *Bot. Gaz.* 37 (1904) 139–143.

tion was paid to the possible disappearance of species in a place where we had the advantage of possessing notes and herbaria prepared in previous decades, the conclusion was reached that five species, none of which had ever been other than strictly local in those towns (by local, I mean confined to single small areas, as single hill-sides or bogs), had been exterminated so far as these towns were concerned. The conclusion reached was:

> It is a most instructive lesson in the survival of what exists that above thirteen-fourteenths of the native habitat has been altogether changed in character, and the other one-fourteenth decidedly modified, without the extinction of a single common forest herb, shrub, or tree.

The chief factor modifying conditions in Ceylon is surely agriculture. With its advance, the existence of the species restricted to such land as is demanded for agriculture must at least be jeopardized. It is hardly possible that there are not during each decade some species lowered in the scale of commonness by clearing and cultivation. The most conspicuous victims of the advance of agriculture are those trees that grow on land of agricultural value. The dominant forest trees of this kind of land throughout the far eastern tropics are the dipterocarps. I have already shown one reason for the rarity of the species of *Doona* and *Stemonoporus*. It seems to me hardly doubtful that the development of agriculture in Ceylon has materially decreased the commonness of these and the species of other dipterocarp genera, and that the existence of some of these trees in the near future will depend upon their deliberate protection by men. Among the peculiarities of the flora of Java, the most outstanding single peculiarity, as compared with that of Borneo, Sumatra, Banca, the Malay Peninsula, or the Philippines, is the limited number of dipterocarps. While seventy-five are known in the Malay Peninsula, and more than one hundred from Borneo, while scantily explored Sumatra has yielded more than thirty, and the Philippines at least seventy-five, Java, botanically better known than any other of these regions, possesses only twelve known species outside of cultivation.

The unquestionable explanation of this extreme scarcity of dipterocarps lies in the use for agriculture of the part of Java suited to dipterocarp forest. It may be that they were never as numerous in Java as in Borneo or even in Sumatra; but that Java contained less species than Banca is incredible. Is it to be supposed that the factors which have cut the dipterocarp species of Java to twelve, while leaving Java with a flora vastly richer

than that of Ceylon in plants whose existence is not so directly menaced by agriculture, will not operate likewise in Ceylon, as the increase of population and the intensification of the use of land brings Ceylon to the point that Java has already reached? Surely, on any well kept plantation in Ceylon, many species once locally common have disappeared. As plantations become more numerous and more extensive and cultivation becomes more intensive, increased rarity and eventual extermination of species, once thriving where agriculture now becomes active, is altogether inevitable. In a sense, this kind of extermination exhibits artificial selection; but artificial selection is never anything but a particular phase of the general process at first distinguished as natural selection. Artificial selection is simply selection in which the will of man is intentionally or incidentally the determining factor.

The validity of the doctrine of natural selection would not be essentially placed in question by the fact that plants are not dying out in Ceylon, even if this were established, unless there were furnished reasons to believe that plants do not die out in general and have not died out in general. That they have died out, everybody knows. Otherwise, where are now the whole groups that, as fossils, we know each year better, which once bridged the gaps between the Pteridophytes of Devonian time and the seed plants? Some good palaeophytogists may tell us how many extinct plants are known this year, but not how many we may know a year or so later. Plants grow rare also, as we know from evidence of the same kind. *Sequoia, Taxodium, Glyptostrobus, Torreya,* and *Cephalotaxus* were once genera of very wide geographical range. The Cretaceous or Miocene botanists would have rated these perhaps as very common. With the passage of time, they have become very rare. *Matonia* represents a group of ferns which for ages was probably world-wide in distribution. It is now known from at least five mountain tops in the Malay Peninsula, Borneo, Sumatra, and Amboina. The dying out of species must be usually a very slow performance, and one that might easily escape attention. We know, though, that it has gone on in geologic time, in early human time (otherwise, where are the wild forms of our common grains?), that it has gone on in recent historic times, in various localities in England, Java, and elsewhere, and it may well be suspected that, at least as agriculture develops in Ceylon, the same process takes place there. However, even if Ceylon conditions are peculiar in this respect, it would be hard to show that natural selection or its failure is responsible for the peculiarity.

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HAWAIIAN FERNS COLLECTED BY J. F. ROCK

By EDWIN BINGHAM COPELAND

(From the College of Agriculture, University of the Philippines, Los Baños, P. I.)

Through the courtesy of Mr. J. F. Rock of the College of Hawaii, I have recently had an opportunity to study the ferns of the College of Hawaii herbarium, and have found among them the following apparently undescribed species. In some groups, especially *Polypodium*, this collection is notably richer than Faurie's,[1] while in other, such as *Asplenium*, it is not so complete. All the specimens here described were collected by Mr. Rock.

ATHYRIUM PSEUDOARBOREUM sp. nov.

Asplenium arboreum Hilleb. non Willd. quid *Athyrium arboreum* Milde.

A. arboreo (Willd.) Milde similis, sed paleis brunneis latioribus prope baseos stipitum, soris longis marginem fere attingentibus, et indusiis latis versus margines suas albidis distinctum, et propter eas indicationes versimiliter phylogenetice diversum.

Lanai, Mahana Valley, in shady, damp places, altitude 770 meters. *Rock 8081.*

There is no question that this is the *Asplenium arboreum* of Hillebrand, page 609, who modified the description, as regards the sori, to fit this fern. But much as the two are superficially alike, *Asplenium arboreum* is a clear-cut member of an American group of species, while *Athyrium pseudoarboreum* represents the Oriental group of *Athyrium japonicum*. *Athyrium kaalaanum* Copel.[2] is also one of this group, but I do not believe it is a juvenile or reduced form of *Athyrium pseudoarboreum;* it has fleshy stipes, a long apex, obtuse pinnae, and short sori. Except for acuminate pinnae and the absence of a gemma, *Athyrium pseudoarboreum* fits Presl's diagnosis of *Diplazium sandwichense*, and I would be tempted to use this name if *Asplenium sandwichianum* were not already in use.

SADLERIA RIGIDA sp. nov.

Caudice ignoto; stipitibus ca. 15 cm longis, validis, ubique densissime paleatis; paleis linearibus, rigidulis, crinitis, rufocastaneis costa spuria castanea, infimis 3 cm longis pallidioribus, sursum usque ad rachides secondarias etenim ad costulas decrescentibus, ibidem costa carentibus; fronde elliptica vel ovata, ca. 33 cm longa, 20–25 cm lata, abrupte acuminata, rhachi dense

[1] Philip. Journ. Sci. 9 (1914) Bot. 435.
[2] Op. cit. 438.

vestita castanea; pinnis medialibus maximis, 13 cm longis, 2 cm latis, imbricatis, acuminatis; segmentis infimis liberis adnatis, aliis anguste confluentibus, 3–4 mm latis, plerumque ob margines involutas angustis, obtusis, integris, rigide coriaceis, superne pilis inferne pilis et paleis angustis fere hyalinis sparse pubescentibus; venis immersis, nigris, trans sorum plerumque simplicibus; soris apices segmentorum fere attingentibus, linearibus, indusiis atrocastaneis.

Kauai, near summit swamp of Waialeale, altitude 1550 meters, legit *Rock*. September, 1909.

This may be the *Sadleria pallida* of Hillebrand and of Christensen's Index, but not *S. pallida* H. & A., of which Hooker[3] says, "It is clearly a trifling variety" (of *S. cyatheoides*), and the Synopsis (p. 18) reads "The original *S. pallida*, H. & A., is a mere form with a paler rachis." Compared with Hillebrand's description, this plant differs in being very dark green above, with veins not prominent though somewhat conspicuous, and sori long and narrow.

Beside a number of specimens from Kauai, Rock sends one from the Haalelepakai Ridge, Lanai.

PTERIS HILLEBRANDII sp. nov.

Eupteris adspectu hybridis P. creticae et P. irregularis; caudice et basi stipitis paleis atrocastaneis nitidis linearibus dense vestito; stipite 30–50 cm alto, stramineo vel castaneo, nitido; fronde 25–40 cm alta, deltoidea; pinnis infimis maximis, stipitatis, ad alam angustam in segmenta pauca linearia deorsum integra apicibus serrulatis pinnatifidis, segmento basiscopico basale solummodo deorsum pinnatisecta lobis paucis; pinnis sequentibus adnatis, 1- vel 2-paribus, subopppositis, paucilobatis; rhachi super pinnas descriptas alata, segmentis superioribus frondis paucis falcatis anguste linearibus, segmento apicale ad basin paucilobata, sursum integra (cauda serrulata excepta), anguste lineare.

Kauai, forests of Kaholuamano above Waimea, in semi-wet region; *Rock 5984, 5983*.

This is *Pteris irregularis* Kaulf. var. *linearis* Hillebrand.[4] Hillebrand's varietal name cannot be used specifically, but the plant is very distinct. *Pteris irregularis* is indeed a very variable fern, as Hooker[5] notes; but even in the simplest forms it shows no tendency, in the many specimens available for study, toward the very long, entire segments of *Pteris Hillebrandii*. In appearance the latter suggests *Pteris heteromorpha* Fée, a smaller fern, even less divided, with finer paleae. Agardh[6] makes a similar observation regarding *Pteris irregularis* and *P. semipinnata* L.

[3] Sp. Fil. 3: 66.
[4] Flora Hawaii 628, from E. Maui.
[5] Species Filicum 2: 173.
[6] Recensio, 19.

ELAPHOGLOSSUM ROCKII sp. nov.

Species gregis E. gorgonei, rhizomate fere 1 cm crasso, cum stipitibus brevissimis et basibus costarum paleis castaneo-ferrugineis anguste linearibus valde crinitis 10-30 mm longis densissime obtectis; fronde 25–40 cm alta, oblanceolata, breviter acuminata, deorsum usque ad basin abrupte truncatam sensim angustata, minute et sparse squamulosa, papyracea (sicca); fronde fertile paullo angustiore, aliter conforme.

Koolau Mountain, Punaluu, *Rock 259, 214.*

This differs from *Elaphoglossum crassicaule* Copel.[7] in its dense mass of brownish paleae, less stout stipe, and less horizontal venation.

Rock's Nos. 212, 215, and 244 differ in having dark chestnut paleae and fronds gradually narrowed below. They may represent still another species; but as more complete collection in the locality where all these were found may close the gap between them, they may stand for the present as varying forms of one kind.

Of *Elaphoglossum Fauriei*, Rock has collected several specimens, all from Molokai.

ELAPHOGLOSSUM HIRTUM (Sw.) C. Chr.

This species is more variable than any description indicates. At one extreme are the most densely scaly plants, with ferruginous rhizomatal paleae, with their tips darker but by no means black. Other very scaly plants have these tips practically black, as described by Hillebrand. At the other extreme are some sparsely scaly plants from Koolau Mountain, Punaluu, with slender stipes and the paleae of the rhizome black throughout. Complete collections would very likely reveal an entire series of intermediate forms. The paleae of the upper surface of the frond are usually paler than those of the nether surface, and this difference sometimes goes so far that the former are clear-white and shining.

POLYPODIUM ROCKII sp. nov.

P. adenophorum, P. sarmentoso affine, stipitibus gracillimus 2–4 cm altis, segmentis remotis decurrentibus linearibus integris, venis costis subparallelis, soris paucis.

Koolau Mountain, Punaluu, *Rock 272.*

Mr. Maxon, of the United States National Museum, has been kind enough to send me photographs of Brackenridge's plate of *Polypodium sarmentosum* and of the type sheet in the National Herbarium, the latter bearing two plants both of which are accurately reproduced on the plate. Of these two, the larger, regarded by Mr. Maxon as the type plant, collected on the mountains back of Honolulu, is surely a freak plant; different as the two appear, they may well represent one species. This is represented by *7074* of the College of Hawaii herbarium, from the Wailau trail, Molokai. The veins leave the costae at an angle much wider than do those of *Polypodium Rockii*. The paleae of the latter are darker, but this difference may not be constant. The specimen of *Polypodium Rockii* shows no "surculi."

[7] Philip. Journ. Sci. 9 (1914) Bot. 440.

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NEW PLANTS FROM SAMAR

By E. D. MERRILL[1]

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The present paper is devoted to the description of new species of plants from Samar, chiefly from the collections made by M. Ramos and G. Edaño, of the Bureau of Science, in northern Samar in February and March, 1916. Thirty-two new species are proposed and described in the families *Araceae, Urticaceae, Opiliaceae, Aristolochiaceae, Amaranthaceae, Annonaceae, Myristicaceae, Lauraceae, Burseraceae, Meliaceae, Euphorbiaceae, Anacardiaceae, Sapindaceae, Vitaceae, Tiliaceae, Sterculiaceae, Theaceae, Guttiferae, Flacourtiaceae, Myrtaceae, Loganiaceae, Verbenaceae,* and *Acanthaceae.*

Perhaps the most interesting single addition to the Philippine flora is the genus *Petersia* of the *Lecythidaceae,* for which the new generic designation *Petersianthus* is proposed below. The genus was previously known only from tropical Africa, where it is represented by two species. The discovery of a third species of this caracteristic genus in the Philippines is of special interest. It was originally described as a species of *Terminalia,* the material on which it was based presenting only leaves and old fruits. The recently collected Samar material presents two specimens with flowers, so that it has been possible from a study of these to determine its proper position.

ARACEAE

POTHOS Linnaeus

POTHOS ACUMINATISSIMUS sp. nov. § *Allopothos, Longivaginati.*

Scandens, glabra, internodiis 3 ad 7 cm longis; foliis oblongis ad oblongo-lanceolatis, chartaceis, in siccitate pallidis, utrinque minute papillulatis, usque ad 25 cm longis, leviter inaequilateralibus, basi acutis, apice tenuiter caudato-acuminatis, nervis collectivis utrinque 2, tenuibus, lateralibus numerosis; pedunculis solitariis, elongatis, quam petiolo longioribus; spathis oblongis, circiter 6 cm longis et 1.2 cm latis, tenuiter caudato-acuminatis,

[1] Associate professor of botany, University of the Philippines.

basi distincte decurrentibus; spadicis cylindraceis, sessilibus, circiter 7 cm longis et 8 mm diametro.

Scandent, glabrous, all parts pale when dry. Branches 3 to 5 mm in diameter, the internodes 3 to 7 cm long. Leaves oblong to oblong-lanceolate, chartaceous, 15 to 25 cm long, 4 to 6 cm wide, the uppermost ones sometimes smaller, slightly inequilateral, one side about one-third narrower than the other, base acute, apex slenderly caudate-acuminate, the caudiform part up to 1 cm in length; collective nerves two on each side of the midrib, from or near the base; lateral nerves numerous, slender, about as prominent as the collective ones, up to 40 on each side of the midrib; petioles 5 to 8 cm long, narrowly winged. Peduncles axillary, solitary, about 10 cm long, slightly thickened upward. Spathes oblong, about 6 cm long and 1.2 cm wide, apex slenderly caudate-acuminate, the base distinctly decurrent. Spadices cylindric, about 6 cm long, sessile, obtuse, about 8 mm in diameter, densely many flowered.

SAMAR, Catubig River at Tagabiran, *Bur. Sci. 24125 Ramos*, February 10, 1916, climbing on trees in damp forests at low altitudes.

The alliance of this species is with *Pothos rumphii* Schott and *P. insignis* Engl., from both of which it differs in many characters. It is most closely allied to the latter.

URTICACEAE

LAPORTEA Gaudichaud

LAPORTEA PLATYPHYLLA sp. nov.

Arbor 6 ad 8 m alta, partibus junioribus inflorescentiisque exceptis glabra; foliis chartaceis ad subcoriaceis, ovatis, usque ad 56 cm longis, breviter abrupteque acuminatis, basi leviter cordatis, nervis utrinque circiter 14, prominentibus; paniculis ♂ axillaribus, angustis, circiter 20 cm longis, floribus fasciculatis, sessilibus, 4-meris.

A tree 6 to 8 m high, glabrous except the more or less pubescent younger parts and the very sparingly pubescent inflorescence. Branches stout, the ultimate ones 1 to 1.5 cm in diameter, the petiolar scars large, prominent. Leaves ovate, chartaceous to subcoriaceous, 50 to 65 cm long, 25 to 35 cm wide, rather pale-olivaceous when dry, slightly shining, base somewhat narrowed, slightly cordate, apex abruptly short-acuminate, the lower surface often densely and minutely white-puncticulate on the nerves and reticulations, in age quite glabrous; lateral nerves about 14 on each side of the midrib, prominent, somewhat curved, anastomosing very close to the margin; petioles 9 to 15 cm long. Staminate panicles axillary, numerous, rather narrow, up to 20

cm in length, sparingly pubescent. Flowers white, numerous, sessile, fascicled, 4-merous, the bracteoles slightly pubescent, linear-lanceolate, 2 to 2.5 mm long, the bracts similar but larger, 5 to 8 mm long. Perianth-segments ovate, about 2 mm long. Filaments 3 mm long. Pistillate flowers not seen.

SAMAR, Catubig River at San José, Pinipisakan, and Palapag, *Bur. Sci. 24406 24274* (type) *Ramos, Sablaya 20*, March, 1916, in thickets and in damp forests along streams at low altitudes, locally known as *lingaton*.

A sufficiently characteristic species apparently not very closely allied to any previously known Philippine form, well characterized by its glabrous leaves.

OPILIACEAE

CHAMPEREIA Griffith

CHAMPEREIA PLATYPHYLLA sp. nov.

Frutex circiter 4 m altus, glaber; foliis oblongo-ellipticis, usque ad 25 cm longis et 12 cm latis, coriaceis, in siccitate utrinque verruculosis, acuminatis, basi acutis vel rotundatis et decurrento-acuminatis, nervis utrinque circiter 8, subtus prominentibus; inflorescentiis laxis, usque ad 10 cm longis, sepalis oblongo-ovatis, acutis, 2 mm longis.

A glabrous erect shrub about 4 m in height. Branches and branchlets terete, grayish, the former lenticellate. Leaves oblong-elliptic, 20 to 25 cm long, 9 to 12 cm wide, olivaceous and usually dull when dry, minutely verruculose on both surfaces, apex acuminate, base acute to rounded and decurrent-acuminate, coriaceous or subcoriaceous; lateral nerves about 8 on each side of the midrib, rather prominent on the lower surface, obscurely anastomosing, the primary reticulations very lax, not prominent, the secondary obsolete; petioles stout, less than 1 cm long. Inflorescences axillary, lax, rather many-flowered, up to 10 cm in length. Flowers greenish-white, their pedicels about 4 mm long. Sepals oblong-ovate, acute, 2 mm long. Filaments about 1 mm long.

SAMAR, Catubig River at Camaniwan, *Bur. Sci. 24248 Ramos*, February 12, 1916, on forested slopes at low altitudes.

A species similar in general appearance and in details of its flowers to *Champereia manillana* (Blume) Merr., from which it is readily distinguished by its very large leaves, most of which are from 20 to 25 cm long and about 11 cm wide.

CHAMPEREIA OBLONGIFOLIA sp. nov.

Frutex vel arbor parva, glabra; foliis oblongis, junioribus membranaceis vetustioribus subcoriaceis, usque ad 18 cm longis et 8 cm latis, basi acutis ad acuminatis, sursum gradatim angustatis, longe acuminatis, utrinque verruculosis, nervis utrinque

circiter 10; infructescentiis paniculatis, usque ad 15 cm longis, fructibus ellipsoideis, 12 ad 16 mm longis.

A shrub or small tree, entirely glabrous. Branches and branchlets terete, brownish, grayish, or olivaceous, lenticellate. Leaves oblong, usually olivaceous, sometimes pale when dry, dull or slightly shining, verruculose on both surfaces, gradually narrowed below to the acute or acuminate base and more gradually narrowed upward to the rather slenderly acuminate apex, when young membranaceous, in age subcoriaceous, 13 to 18 cm long, 4.5 to 8 cm wide; lateral nerves about 10 on each side of the midrib, irregular, prominent or rather prominent on the lower surface, obscurely anastomosing, the reticulations subobsolete or obsolete; petioles 5 to 10 mm long. Infructescences from the branches below the leaves, paniculate, up to 15 cm in length, stout, the lower branches up to 7 cm in length. Fruits numerous, ellipsoid, smooth, yellowish-brown or brown when dry, 12 to 16 mm long.

SAMAR, Catubig River at Mount Capatoan, *Bur. Sci. 24382 Ramos* (type), February 19, 1916, on damp forested slopes at low altitudes. Apparently referable here are *Bur. Sci. 24847 Edaño*, from the Catubig River, and *Bur. Sci. 17565 Ramos* from the vicinity of Catbalogan.

Manifestly closely allied to *Champereia manillana* (Blume) Merr., from which it is readily distinguished by its longer, more numerously nerved leaves, larger panicles, and larger fruits. The leaf characters alone distinguish it at once from *Champereia platyphylla* Merr., described above.

ARISTOLOCHIACEAE

ARISTOLOCHIA Tournefort

ARISTOLOCHIA SAMARENSIS sp. nov. § *Diplolobus*.

Ut videtur erecta, novellis inflorescentiisque parce pilosis exceptis glabra; foliis oblongis ad oblongo-ellipticis, membranaceis, nitidis, usque ad 20 cm longis, utrinque subaequaliter angustatis, basi acutis, apice tenuiter acute acuminatis, nervis utrinque circiter 6; racemis axillaribus, brevibus, paucifloris, bracteis ovatis ad oblongo-ovatis, 5 ad 6 mm longis; calycis glabris, utriculis ellipsoideis, circiter 3.5 cm longis, tubo apicali valde refracto, angusto, labio anguste oblongo, ligulato, circiter 4.5 cm longo.

Apparently erect, said by the the collector to be about 1 m high, glabrous except the sparingly pilose younger parts and the inflorescence. Branches subolivaceous, longitudinally striate. Leaves oblong to oblong-elliptic, membranaceous, shining, subolivaceous, 15 to 20 cm long, 6 to 7 cm wide, subequally narrowed to the acute base and to the slenderly acute-acuminate apex; lateral nerves about 6 on each side of the midrib, curved-

ascending, anastomosing, prominent, the reticulations lax, prominent; petioles 6 to 10 mm long. Racemes axillary, sparingly pilose, few-flowered, the rachis not exceeding 1 cm in length, the bracts ovate to oblong-ovate, acute or acuminate, 5 to 6 mm long. Pedicels 2 mm long. Ovarian part of the perianth about 5 mm long, narrowed below, longitudinally 6-ridged, the part above the ovary membranaceous, inflated, the utricular portion ellipsoid, about 3.5 cm long, then abruptly narrowed into the slender, reflexed tube, this narrow portion of the tube 1 to 1.5 cm long, slightly enlarged upward, 1-lipped, the lip narrowly oblong, about 4.5 cm long and 1 cm wide, apiculate-acuminate. Column about 6 mm long, with a short stout stipe, the lobes 6, narrowly oblong, about 3 mm long. Anthers 12, ellipsoid, about 1.5 mm long. Capsule ovoid, prominently ridged, about 1.5 cm long.

SAMAR, Catubig River at Pinipisakan, *Bur. Sci. 24410 Ramos*, March 20, 1916, in damp forests near the river at low altitudes.

A very characteristic species with vegetative characters similar to those of *Aristolochia philippinensis* Warb., but with very much larger, entirely different flowers.

AMARANTHACEAE

CYATHULA Loureiro

CYATHULA LANCIFOLIA sp. nov. § *Telostachys*.

Species *C. prostratae* affinis, differt foliis valde diversis, lanceolatis, usque ad 6 cm longis et 1 cm latis.

Stems elongated, sparingly branched, the lower part prostrate and rooting at the nodes, the flowering branches ascending, the older parts glabrous or sparingly pubescent, the younger parts sometimes fairly densely pubescent with short, subappressed, pale hairs. Leaves membranaceous, olivaceous when dry, lanceolate, 4.5 to 6 cm long, about 1 cm wide, base acute, apex obtuse and usually short-apiculate, margins entire, both surfaces with very few scattered hairs; lateral nerves 7 to 9 on each side of the midrib, slender, anastomosing, the reticulations lax. Racemes simple, terminal, up to 15 cm in length, pubescent. Flowers very similar to those of *Cyathula prostrata*, reflexed, about 3 mm long, their pedicels jointed, 0.5 to 1 mm long, the bracts oblong-lanceolate, acuminate, 1 to 1.5 mm long. Sepals oblong, acuminate, 3-nerved, sparingly appressed-pilose on the back. Spines of the sterile flowers very numerous, 1 to 1.5 mm long, glabrous, hooked at the tip. Utricle ellipsoid, 1.5 mm long.

SAMAR, Catubig River at Tagibiran, *Bur. Sci. 24553* (type), *24514 Ramos*, February, 1916, in damp forests at low altitudes.

A species manifestly closely allied to the widely distributed *Cyathula prostrata* Blume, but with entirely differently shaped leaves. In its inflorescence and floral structure it is very similar to Blume's species.

ANNONACEAE

PAPUALTHIA Diels

PAPUALTHIA SAMARENSIS sp. nov.

Frutex vel arbor parva subtus foliis ad costa ramulisque dense ferrugineo-pubescentibus; foliis oblongis, subcoriaceis, usque ad 15 cm longis, acuminatis, basi cordatis, aequilateralibus vel leviter inaequilateralibus, brevissime petiolatis, nervis utrinque 10 ad 12, subtus cum reticulis primariis prominentibus; floribus solitariis, longissime tenuiterque pedicellatis, circiter 1.5 cm longis, petalis crassissime coriaceis, oblongis, obtusis, extus plus minusve pubescentibus; carpellis circiter 10, anguste oblongis; stigma capitata, leviter hirsuta.

A shrub or small tree, the branchlets, petioles, and the midrib on the lower surface densely ferruginous-pubescent. Branches slender, terete, glabrous, dark-brown or nearly black when dry. Leaves subcoriaceous, generally oblong, sometimes a little wider in the upper part than below, rather pale when dry, somewhat shining, 10 to 15 cm long, 2.5 to 4.5 cm wide, apex prominently acuminate, the acumen blunt, base abruptly rounded, cordate, equilateral or slightly inequilateral, the upper surface smooth, glabrous, pale, the lower somewhat pale-brownish; lateral nerves 10 to 12 on each side of the midrib, very prominent, coarsely anastomosing, the primary reticulations lax, prominent; petioles about 2 mm long. Flowers solitary, in the uppermost axils, their slender glabrous pedicels up to 11 cm in length. Flowers about 1.5 cm long, smaller when immature, pinkish-white. Calyx-lobes broadly ovate, coriaceous, acute, sparingly ciliate, 2.5 to 3 mm long, forming a nearly triangular calyx. Corolla up to 1.5 cm long, the lobes wholly united for the lower 3 to 4 mm, very thickly coriaceous, externally more or less appressed-pubescent in the lower part, the lobes oblong or narrowly oblong, obtuse, up to 12 mm long, 3.5 to 4.5 mm wide. Stamens indefinite, crowded, 1.8 to 2 mm long, the connectives truncate, concealing the anther-cells. Carpels about 10, narrowly oblong, slightly pubescent; style short, slender; stigma obovoid or capitate, somewhat hirsute. Fruit globose, glabrous, dark-brown when dry, shining, about 8 mm in diameter.

SAMAR, Catubig River at Camaniwan, *Bur. Sci. 24180* Ramos, in damp forests at low altitudes, February 3, 1916.

The seventh species of this recently described genus to be found in the Philippines. It is apparently most closely allied to *Papualthia loheri* Merr., but is readily distinguished by its indumentum.

OROPHEA Blume

OROPHEA LEYTENSIS sp. nov.

Frutex 3 ad 4 m altus, partibus junioribus inflorescentiisque exceptis glaber; foliis plerumque oblongis, usque ad 30 cm longis, firme chartaceis, acuminatis, basi subacutis ad rotundatis, nervis utrinque circiter 15; inflorescentiis axillaribus et e axillis defoliatis, dense ciliato-hirsutis, floribus fasciculatis vel in racemis depauperatis dispositis, pedicellis circiter 1 cm longis; sepalis reflexis; petalis interioribus circiter 7 mm longis, breviter unguiculatis, exterioribus 4 ad 5 mm longis, elliptico-ovatis, reflexis; staminibus 5 vel 6; carpellis 6, oblongo-ovatis, hirsutis, sursum angustatis.

A shrub 3 to 4 m high, the younger branchlets and inflorescence densely subappressed-villous with pale-brownish hairs, the older parts quite glabrous. Branches reddish-brown, terete, wrinkled when dry. Leaves generally oblong, 20 to 30 cm long, 7 to 12 cm wide, firmly chartaceous, pale or pale-brownish when dry, base subacute to rounded, apex generally slenderly acuminate, the very young leaves more or less appressed-pilose, in age entirely glabrous; lateral nerves about 15 on each side of the midrib, prominent on the lower surface, somewhat ascending, obscurely anastomosing close to the margin; petioles stout, 3 to 5 mm long. Flowers dull-reddish, axillary, or mostly on the branches from the axils of fallen leaves, the inflorescence densely subappressed-pubescent with pale hairs, of simple fascicles or of fascicled, greatly reduced, short racemes, the bracts ovate to ovate-lanceolate, acuminate, 3 to 3.5 mm long, densely ciliate-pubescent, the pedicels usually about 1 cm long, sometimes shorter. Sepals reflexed before the flower opens, ovate, about 4 mm long, obtuse to acute, pubescent. Outer three petals ovate to ovate-elliptic, obtuse, reflexed, pubescent, about 5 mm long. Inner three petals arched over the stamens and carpels, densely pubescent externally, the claw short, about 2 mm long, the limb rhomboid, about 5 mm long and wide, acute to obtuse. Stamens 5, broadly obovoid, about 1.2 mm long. Carpels 6, oblong or oblong-ovoid, narrowed upward, appressed-pubescent, about 1.5 mm long.

SAMAR, Catubig River at Cagmanaba, *Bur. Sci. 24468* (type), *24292 Ramos*, February 26, 1916, in damp forests at low altitudes. LEYTE, Tacloban, *Wenzel 1723*, April 5, 1916, in forests.

The Samar specimen being much better than the one from Leyte has

been made the type of the species. It is characterized by its comparatively large leaves, and is in the alliance with *Orophea tarrosae* Merr., *O. williamsii* Merr., and *O. submaculata* Elm., from all of which it is readily distinguishable by its larger leaves and more numerous lateral nerves, as well as in its floral characters.

MYRISTICACEAE

KNEMA Loureiro

KNEMA STELLATA sp. nov.

Arbor alta, ramulis junioribus costa subtus petiolis fructibusque dense stellato-ferrugineo-tomentosis; foliis coriaceis, oblongis ad oblongo-lanceolatis, usque ad 23 cm longis, integris, olivaceis, nitidis, subtus pallidis, basi acutis ad rotundatis, apice tenuiter acuminatis, nervis utrinque circiter 25, subtus valde prominentibus; fructibus pedunculatis, ellipsoideis, vel globoso-ovoideis, 1.8 ad 2.3 cm longis, extus densissime ferrugineo-tomentosis.

A tall tree, the very young leaves, the branchlets, the midrib on the lower surface, the petioles, and the entire infructescence densely stellate-tomentose with short ferrugineous hairs. Branches brown, rugose, terete, ultimately glabrous. Leaves coriaceous, oblong to oblong-lanceolate, 14 to 23 cm long, 2.5 to 6 cm wide, entire, gradually narrowed upward to the slenderly acuminate apex, the acumen usually acute, base acute to rounded, the upper surface olivaceous, shining, entirely glabrous, the lower pale, glaucous, the midrib and nerves somewhat brownish, more or less stellate-tomentose; lateral nerves about 25 on each side of the midrib, very prominent on the lower surface, somewhat curved, anastomosing; petioles 1 to 1.5 cm long, stellate-tomentose. Flowers not seen. Infructescences axillary, each with from one to three fruits, all parts densely ferruginous-tomentose, the fruits ellipsoid or ovoid-globose, 1.8 to 2.4 cm long, their peduncles stout, up to 1 cm in length; aril lacerate in the upper one-third.

SAMAR, Catubig River, at Canabaan, Cagmanaba, and Palapag, *Bur. Sci. 24276* (type), *24430 Ramos, Sablaya 52*, February and March, 1916; Ambalate, *Phil. Pl. 1706 Ramos*, April, 1914 (distributed as *Knema stenocarpa* Warb.), in forests at low altitudes.

A characteristic species in many respects resembling *Knema glomerata* (Blanco) Merr. (*K. heterophylla* Warb.), but readily distinguished from this and from other species by its simply stellate-tomentose indumentum.

LAURACEAE

ENDIANDRA R. Brown

ENDIANDRA LAXIFLORA sp. nov.

Arbor circiter 15 m alta, prominente ferrugineo-pubescentibus; foliis coriaceis, nitidis, ellipticis ad oblongo-ovatis, usque ad 30

cm longis, basi acutis, apice prominente acuminatis, nervis utrinque circiter 7, subtus valde prominentibus, reticulis primariis laxis, prominentibus, ultimis utrinque dense jejeune foveolatis; inflorescentiis axillaribus, solitariis, longe pedunculatis, laxis, paucifloris, dense ferrugineo-pubescentibus, usque ad 11 cm longis; floribus junioribus circiter 4 mm longis; fructibus oblongo-ellipsoideis, in siccitate brunneis, circiter 4 cm longis, glabris.

A tree about 15 m high, the branches, branchlets, and inflorescence densely ferruginous-pubescent, the leaves prominently pubescent on the lower surface, the upper surface ultimately glabrous or nearly so. Branches terete, pale or brownish. Leaves coriaceous, brownish or somewhat olivaceous when dry, shining, elliptic to oblong-ovate, apex prominently and usually slenderly acuminate, base acute, 15 to 30 cm long, 9 to 20 cm wide; lateral nerves about 7 on each side of the midrib, very prominent on the lower surface, curved-ascending, anastomosing, the primary reticulations lax, prominent, the ultimate ones close, both surfaces shallowly and densely foveolate; petioles pubescent, 1 to 2 cm long. Inflorescences axillary, lax, peduncled, densely ferruginous-pubescent, rather few flowered, up to 11 cm long, flower-bearing in the upper third. Young flowers densely ferruginous-pubescent, about 4 mm long. Fruits oblong-ellipsoid, hard, dark-brown and glabrous, rounded at both ends, about 4 cm long and 2 cm in diameter.

LUZON, Province of Tayabas, Sampaloc, *For. Bur. 24516 Labitag* (type), *For. Bur. 25423 Duldulao*, April, 1916, in semi-open forests, altitude 300 to 400 meters. SAMAR, Catubig River, *Bur. Sci. 24426, 24280 Ramos*, February, 1916. It is locally known in Tayabas as *malagasaha*.

In many respects this species closely resembles *Endiandra coriacea* Merr. and *E. arborea* Elm., but is distinguished by its larger leaves and especially by its characteristic indumentum.

BURSERACEAE

CANARIUM Linnaeus

CANARIUM SAMARENSE sp. nov. § *Parvifolia.*

Arbor parva, circiter 6 m alta, partibus junioribus plus minusve ferrugineo-hirsutis; foliis usque ad 30 cm longis, foliolis 5 vel 7, firme chartaceis vel subcoriaceis, glabris, nitidis, acuminatis, oblongis, usque ad 20 cm longis, nervis utrinque circiter 11, subtus valde prominentibus; inflorescentiis axillaribus, solitariis, spicatiis, usque ad 20 cm longis vel ♀ sub fructu longioribus; floribus ♂ solitariis vel fasciculatis, 3-meris, circiter 6 mm longis, calycis cupuliformibus, extus plus minusve ferrugineo-hirsutis, lobis acutis; petalis 6 mm longis, sursum leviter pubes-

centibus; filamentis basi connatis; discus nullus; ovarium rudimentarium glabrum, breviter stipitatum; fructibus junioribus anguste ovoideis, circiter 12 mm longis.

A small tree, about 6 m high, glabrous except the younger parts and the sparingly pubescent spikes. Branches slender, terete, glabrous, pale-brownish, the young branchlets usually densely subferrugineous-pubescent. Leaves alternate, up to 30 cm long, glabrous, the leaflets oblong, firmly chartaceous or subcoriaceous, 12 to 20 cm long, 5 to 6 cm wide, entire, olivaceous or greenish when dry, shining and of about the same color on both surfaces, base acute, rarely rounded, apex rather prominently blunt-acuminate; lateral nerves about 11 on each side of the midrib, very prominent on the lower surface as are the primary lax reticulations, curved, anastomosing; petiolules 1 to 1.5 cm long; stipules linear, somewhat curved, stiff, about 5 mm long. Inflorescence a simple, axillary, solitary spike, the staminate ones 10 to 20 cm long, the pistillate ones in fruit up to 30 cm in length, when young more or less appressed-pubescent, in age glabrous or nearly so. Male flowers white, 3-merous, about 6 mm long, scattered or fascicled along the rachis. Calyx cup-shaped, 3 mm long, externally appressed-pubescent, the lobes triangular, acute, at least 1 mm long. Petals 3, oblong, about 6 mm long, 1.2 mm wide, the apical portions sparingly pubescent, imbricate. Disk none. Stamens 6, the filaments united below into a 1 mm long tube, the free portions slender, 2.5 mm long; anthers oblong, 2 mm long. Rudimentary ovary free, ovoid, glabrous, angular, on a short stipe as long as the ovary. Immature fruits narrowly ovoid, about 1.2 cm long, narrowed upward, glabrous.

SAMAR, Catubig River at Cagmanaba, Camaniwan, and at Palapag, *Bur. Sci. 24191* (type), *24149*, *24214 Ramos*, *Bur. Sci. 24879 Edaño*, February and March, 1916, along small streams and on forested slopes at low altitudes, locally known as *pangahauon*.

By definition this species falls in the section *Parvifolia* Engl., but does not resemble the other species placed here; the disk is entirely wanting. In facies it somewhat resembles *Canarium thyrsoideum* Perk., and *C. polyneuron* Perk., differing however in its fewer leaflets, different inflorescences, and very different floral characters.

CANARIUM ROBUSTUM sp. nov.

Arbor alta, ramulis robustis, 1.5 ad 2 cm diametro, densissime ferrugineo-pubescentibus; foliis usque ad 90 cm longis, prominente hirsutis, foliolis chartaceis vel subcoriaceis, ellipticis ad oblongo-ellipticis, integris, usque ad 28 cm longis, abrupte acuminatis, basi late rotundatis vel subcordatis, nervis utrinque 18 ad

25, prominentibus, utrinque hirsutis; racemis fructiferis axillaribus, 12 ad 28 cm longis, pedunculatis; fructibus oblongo-ellipticis, glabris, 3 ad 3.5 cm longis, utrinque subaequaliter angustatis, acutis, obscure vel vix triangularis, in siccitate longitudinaliter subprominente 6-costulatis.

A tall tree, the branches robust, the ultimate branchlets densely ferruginous-pubescent with short hairs, 1.5 to 2 cm in diameter, striate when dry. Leaves alternate, up to 90 cm in length, the petioles, rachis, and petiolules rather densely villous with short spreading hairs, the leaflets on both surfaces prominently hirsute with stiff, spreading, elongated hairs, the stout petioles about 8 mm in diameter at the base and somewhat flattened on the upper surface; leaflets about 10, elliptic to oblong-elliptic, chartaceous to subcoriaceous, entire, greenish-olivaceous when dry, shining, the midribs, nerves, and reticulations on both surfaces copiously supplied with stiff, pale or brownish, spreading hairs, base rounded or somewhat cordate, apex abruptly and rather prominently acute-acuminate; lateral nerves 18 to 25 on each side of the midrib, very prominent on both surfaces, spreading, anastomosing, the primary reticulations prominent; petiolules 3 to 8 mm long; stipules linear-oblong, stiff, curved, densely tomentose, about 7 mm long. Fruiting racemes axillary, ferruginous-pubescent, stout, 12 to 28 cm long, fruit-bearing in the upper one-half only, the fruiting pedicels stout, about 1 cm long, the persistent calyx-lobes triangular-ovate, acute, ferruginous-pubescent, 5 to 7 mm long. Fruits oblong-elliptic, scarcely or not at all 3-angled, 3 to 3.5 cm long, 1.5 to 1.8 cm in diameter, pale-brown when dry, glabrous or with very few, scattered, stiff, brown hairs, subequally narrowed at both ends, the apex acute, longitudinally 6-ridged when dry, the ridges rather prominent. usually also with fainter intermediate ridges.

SAMAR, Catubig River as Tagabiran, and at Palapag, *Bur. Sci. 24512* (type), *24450 Ramos*, February and March, 1916, on forested slopes at low altitudes, locally known as *malapiliay*.

A species in many respects resembling *Canarium racemosum* Merr., of Mindanao, from which it is readily distinguished by its entire, not denticulate leaves; it differs also in numerous other characters, such as its thinner, more acuminate, more hirsute leaflets, and its nearly glabrous fruits. It seems to be less closely allied to *Canarium costulatum* Elm.

MELIACEAE

AGLAIA Loureiro

AGLAIA STENOPHYLLA sp. nov. § *Euaglaia*.

Arbor parva, plus minusve minute stellato-pubescentibus; foliis alternis, usque ad 20 cm longis, foliolis 9 ad 11, alternis, lan-

ceolatis ad anguste lanceolatis, membranaceis, usque ad 22 cm longis et 3 cm latis, tenuiter acute acuminatis, nervis utrinque numerosis, tenuibus; inflorescentiis axillaribus, paniculatis, brevibus, circiter 5 cm longis; floribus minutis, pedicellatis, 5-meris, in ramulis ultimis racemose dispositis, tubo libero; fructibus globosis vel ovoideis, 1.5 ad 2 cm diametro, in siccitate extus densissime rufo-tomentosis.

A small tree, the branches slender, grayish, rugose, glabrous, the branchlets densely ferruginous or subferruginous-pubescent with minute stellate hairs, a similar indumentum on the petioles, rachis, inflorescence, and midribs on the lower surface of the leaflets. Leaves alternate, up to 40 cm in length; leaflets 9 to 11, membranaceous, greenish-olivaceous when dry, the lower surface somewhat paler than the upper, 12 to 22 cm long, 1.5 to 3 cm wide, the apex slenderly and sharply acuminate, the base acute to rounded, sometimes slightly inequilateral; primary nerves 20 to 25 on each side of the midrib, slender, anastomosing, curved; petiolules 2 to 3 mm long. Panicles axillary, solitary, about 5 cm long, narrowly pyramidal, the primary branches few, the lower ones 2 cm long or less. Flowers white, racemosely arranged on the ultimate branchlets, 5-merous, minute, their pedicels 2 to 2.5 mm long. Calyx about 1.5 mm in diameter, the lobes 0.5 mm long, ovate, obtuse, outside densely stellate-pubescent. Petals 5, free, elliptic, glabrous, rounded, concave, about 1.2 mm long. Staminal-tube free, ovoid, truncate, glabrous, about 1 mm long, the five anthers included. Fruit globose or ovoid, reddish-yellow when fresh, the pulp edible, sweet, when dry 1.5 to 2 cm in diameter, the pericarp subcoriaceous, reddish-brown, densely and minutely pubescent; seeds usually two, oblong, about 1.2 cm long.

SAMAR, Catubig River, *Bur. Sci. 24182* Ramos, February 11, 1916, in damp forests at low altitudes.

A most characteristic species, readily distinguishable from all described forms by its narrow, elongated leaflets and its very short panicles. According to C. DeCandolle's arrangment of the species it falls in the group with *Aglaia llanosiana* C. DC., but has little in common with this species or any of the others placed with it.

AGLAIA SAMARENSIS sp. nov. § *Hearnia*.

Arbor parva, ramulis junioribus petiolis inflorescentiisque minute subcupreo-lepidotis; foliis alternis, 14 ad 18 cm longis 2- vel 3-jugis, foliolis subcoriaceis, glabris, oblongo-obovatis ad late oblongo-oblanceolatis, usque ad 9 cm longis, prominente acuminatis, deorsum sensim angustatis, basi cuneatis vel attenuatis, nervis utrinque 8 vel 9, subtus cum reticulis prominenti-

bus; paniculis plerumque axillaribus, laxis, usque ad 12 cm longis; floribus 5-meris, in ramulis ultimis racemose dispositis.

A small tree, about 5 m high, younger parts of the branchlets, petioles, and inflorescences densely and minutely subcupreous-lepidote, the leaflets entirely glabrous. Branches terete, brownish, glabrous. Leaves alternate, 14 to 18 cm long, the leaflets 5 or 7, opposite or subopposite, subcoriaceous, oblong-obovate to broadly oblong-oblanceolate, 6 to 9 cm long, 1.5 to 3.5 cm wide, apex prominently subcaudate-acuminate, the acumen blunt, gradually narrowed from above the middle to the attenuate or cuneate base, the upper surface smooth, grayish-olivaceous when dry, shining, the lower slightly brownish; lateral nerves 8 or 9 on each side of the midrib, prominent, curved, anastomosing, the reticulations lax, prominent on the lower surface; petiolules 3 to 5 mm long. Panicles mostly axillary, peduncled, up to 12 cm long, lax, the branches few, spreading, the lower ones up to 4 cm long, the flowers rather numerous, laxly racemose-cymose on the ultimate branchlets, their pedicels jointed, 1 to 2 mm long. Calyx ovoid, about 1.2 mm in diameter, lepidote, the lobes 5, short, rounded. Petals 5, free, glabrous, orbicular-elliptic, rounded, 1 to 1.2 mm long. Staminal-tube free, turbinate, about 1 mm long, the margin crenulate. Anthers 5 or 6, suborbicular, 0.2 mm long, inserted at the apex of the tube, alternate with the short teeth, inflexed.

SAMAR, Catubig River, Camaniwan, *Bur. Sci. 24197 Ramos*, February 8, 1916, in forests at low altitudes, flowers white.

A species belonging in the same group with *Aglaia affinis* Merr. and *A. diffusa* Merr., differing from the former in its glabrous branches and prominently nerved, differently shaped leaflets. It is readily distinguishable from *Aglaia diffusa* Merr. by its prominent reticulations, and differs also in numerous other characters.

AMOORA Roxburgh

AMOORA FULVA sp. nov. § *Pseudo-Guarea*.

Arbor circiter 12 m alta, prominente fulvo-tomentosa; foliis usque ad 40 cm longis, alternis; foliolis circiter 8, coriaceis, ellipticis ad oblongo-ellipticis, usque ad 18 cm longis, breviter abrupte obtuseque acuminatis, basi rotundatis, costa nervisque utrinque fulvo-villosis; paniculis circiter 20 cm longis, robustis, angustis, multifloris; floribus 4-meris, circiter 1.8 cm longis, sessilibus, in ramis primariis spicatim dispositis, omnibus partibus dense villosis, calycis cupuliformibus, truncatis, stylis quam ovario multo longioribus.

A tree about 12 m high, the branchlets, petioles, midribs, and nerves on both surfaces of the leaves, and the inflorescence

densely fulvous-tomentose. Branches up to 1 cm in diameter. Leaves alternate, up to 40 cm in length; leaflets about 8, opposite, coriaceous, elliptic to oblong-elliptic, 10 to 18 cm long, 5.5 to 8 cm wide, pale-brownish on both surfaces when dry, base rounded, somewhat inequilateral, apex abruptly and shortly blunt-acuminate; lateral nerves 10 to 15 on each side of the midrib, prominent on both surfaces, spreading, curved near the margins, anastomosing; petiolules stout, 3 to 5 cm long, densely fulvous-tomentose. Panicles in the uppermost axils, about 20 cm long, all parts densely tomentose, long-peduncled, narrow, branched in the upper one-half, the branches spreading, 1 to 2 cm long, the flowers somewhat crowded and spicately arranged on the primary branches. Flowers white, tinged with pink, fragrant, 4-merous, about 1.8 cm long in anthesis, cylindric, stout. Calyx cup-shaded, about 7 mm long and wide, truncate, densely villous. Petals 4, oblong, about 1.8 cm long, 6 to 7 mm wide, truncate, coriaceous, outside densely appressed fulvous-villous, inside glabrous, free or nearly so. Staminal-tube cylindric, about 15 mm long, 4 to 5 mm in diameter, densely appressed-pubescent outside, retrorse-villous inside, the apex with 6, oblong, truncate and slightly retuse, 2 mm long lobes. Anthers oblong, alternate with the lobes, 3.5 mm long. Disk a dense ring of short hairs. Ovary ovoid, pubescent, narrowed upward, the style densely pubescent, much longer than the ovary, style and ovary together attaining a length of about 13 mm, the upper two mm of the style quite glabrous; stigma subcapitate. Fruit unknown.

SAMAR, Catubig River at Pinipisakan, *Bur. Sci. 24497 Ramos*, March 21, 1916, in damp forests along the river at low altitudes.

A most characteristic species, readily distinguished by its fulvous indumentum and its narrow, dense panicles, the flowers spicately crowded near the apices of the short primary branches of the inflorescence. It does not appear to be closely allied to any previously described form.

CHISOCHITON Blume

CHISOCHITON CAULIFLORUS sp. nov.

Arbor, ramulis petiolis foliolis subtus ad costa nervisque inflorescentiisque plus minusve fulvo-villosis vel subhirsutis; foliis usque ad 50 cm longis; foliolis circiter 8, oppositis, oblongis, subcoriaceis, usque ad 22 cm longis, acuminatis, nervis utrinque 8 ad 15, prominentibus; inflorescentiis 20 ad 50 cm longis, anguste paniculatis, e truncis et ramis vetustioribus vel interdum e ramulis junioribus; floribus 4-meris, circiter 2 cm longis, calycis cupuliformibus, truncatis, 4 ad 5 mm longis, extus subdense adpresse

fulvo-villosis; petalis extus parce adpresse villosis; antheris 8; tubo libero, truncato, quam petalis paullo brevioribus, extus parce adpresse villoso.

A tree, size not indicated, more or less fulvous-villous or hirsute with usually appressed hairs. Ultimate branches brown, glabrous, up to 1 cm in diameter, the branchlets sparingly fulvous-villous, the very young leaves densely so. Leaves alternate, up to 50 cm in length, the petioles, costa, midrib, and lateral nerves on the lower surface prominently appressed fulvous-villous; leaflets 4 to 8, possibly more on the older branches, oblong, subcoriaceous, brownish when dry, exceedingly variable in size, 10 to 22 cm long, 4 to 5 cm wide, entire, or the younger ones prominently repand-undulate, acuminate, base acute to rounded; lateral nerves 8 to 15 on each side of the midrib, prominent. Inflorescences narrowly paniculate, from tubercles on the trunk and larger branches, sometimes axillary on the young branchlets, 20 to 50 cm long, prominently fulvous-villous, the branches scattered, few flowered, mostly under 4 cm in length, slender. Flowers 4-merous, about 1.8 cm long. Calyx cup-shaped, truncate, 4 to 5 mm long, rather densely appressed fulvous-villous. Petals 4, free or nearly so, about 18 mm long, somewhat spatulate, apical portion rounded, 3 mm wide, outside, especially in the upper part, sparingly appressed-villous. Staminal-tube cylindric, free, about 16 mm long, truncate, outside appressed-villous. Stamens 8, the anthers oblong, 2 mm long. Ovary (rudimentary) very densely villous-hirsute, the style about as long as the staminal tube, appressed-villous in the lower two-thirds, glabrous above; stigma subcapitate.

SAMAR, Catubig River, *Bur. Sci. 24457* (type), *24519 Ramos*, March, 1916, in forests at low altitudes near Las Navas, locally known as *malapauhauli*.

The alliance of this characteristic species is manifestly with *Chisochiton tetrapetalus* Turcz., from which it differs not only in its cauline inflorescence, but also in its prominent indumentum, its larger, fewer flowers, densely villous ovary, petals sparingly villous externally, prominently pubescent truncate calyx, and numerous other characters.

EUPHORBIACEAE

EXCOECARIA Linnaeus

EXCOECARIA STENOPHYLLA sp. nov. § *Commia*.

Frutex glaber, monoicus; foliis alternis, subcoriaceis, integris, lineari-lanceolatis, usque ad 11 cm longis et 1 cm latis, nitidis, obtusis vel leviter acuminatis; inflorescentiis axillaribus, racemis 2 ad 3 cm longis; floribus ♂ numerosis, bracteis 4-glandulosis,

1-floris, sepalis liberis, acutis vel acuminatis, denticulatis, staminibus 3; floribus ♀ paucis, ad basin inflorescentiae vel in racemis brevibus distinctis.

A glabrous monoecious shrub the branches and branchlets terete, brownish. Leaves alternate, linear-lanceolate, subcoriaceous, entire, 6 to 11 cm long, 6 to 10 mm wide, greenish-olivaceous and shining when dry, subequally narrowed to the acute base and to the obtuse to slightly acuminate apex, the margins recurved; lateral nerves 15 to 20 on each side of the midrib, distant, slender, leaving the midrib at right angles. Racemes axillary, 2 to 3 cm long, some all staminate, others with one or two pistillate flowers at the base. Staminate flowers numerous, one to each bract, their pedicels about 0.5 mm long, the bracts broadly ovate, acute to acuminate, about 1 mm long, usually with two small, subbasal glands on each side. Sepals 3, ovate, acuminate, about 1 mm long; the margins slightly lacerate-denticulate. Stamens 3; filaments free, about 1 mm long. Pistillate flowers few, one or two at the base of the staminate raceme or on short separate racemes. Sepals 3, oblong-ovate, acuminate, margins lacerate-denticulate. Ovary ovoid; style arms stout, recurved, 1.5 to 2 mm long. Cocci about 6 mm long, the seeds dark-brown, smooth, shining, ovoid-subglobose, 4 to 5 mm long.

SAMAR, Catubig River at Pinipisakan, *Bur. Sci. 24348 Ramos*, March 21, 1916, on steep forested slopes at low altitudes, locally known as *calipayan*.

A most characteristic species easily distinguished from all described forms by its very narrow, elongated leaves.

TRIGONOSTEMON Blume

TRIGONOSTEMON ACUMINATUS sp. nov.

Frutex circiter 4 m altus partibus junioribus plus minusve adpresse hirsutus exceptis glaber; foliis longe petiolatis, oblongo-lanceolatis ad lanceolatis, usque ad 27 cm longis, basi obtusis ad subacutis, apice longe tenuiterque subcaudato-acuminatis, margine distanter apiculato-serrulatis, nervis utrinque 13 ad 15; inflorescentiis ♀ axillaribus, tenuibus, folia subaequantibus simplicibus vel parce ramulosis, paucifloris, bracteis foliaceis ovatis ad lanceolatis acuminatis usque ad 3.5 cm longis instructis; floribus solitariis, longe pedicellatis, 5-meris.

A shrub about 4 m high, monoecious, the younger parts sparingly appressed-hirsute, otherwise glabrous or nearly so. Branches pale-brownish, terete, glabrous. Leaves aiternate, chartaceous, olivaceous when dry, the lower surface paler than the upper, oblong-lanceolate to lanceolate, 16 to 27 cm long, 4 to 8.5 cm wide, base acute or obtuse, apex long and slenderly sub-

caudate-acuminate, margins distantly apiculate-serrate, the teeth sometimes distinct, sometimes obscure; lateral nerves 13 to 15 on each side of the midrib, prominent on the lower surface; petioles 3 to 12 cm long. Pistillate inflorescences axillary, solitary, simple or sparingly branched, up to 40 cm in length, slender, the flowers few, scattered, each subtended by a leaf-like bract, varying from ovate to lanceolate, acuminate, 1.5 to 3.5 cm long. Pedicels thickened upward, about 2 cm long. Sepals 5, oblong, obtuse, 4 to 4.5 mm long, very sparingly appressed-hirsute. Petals 5, free, black-purple, about as long as the sepals, narrowly oblong-obovate, rounded. Ovary ovoid, somewhat pubescent; styles 3, free, cleft, the arms slender, 1.5 mm long. Disk-glands truncate, 0.5 mm long. Capsules ovoid, about 1 cm long, glabrous, composed of three dehiscent cocci.

SAMAR, Catubig River, at Cagminaba, Las Navas, and Camaniwan, *Bur. Sci. 24189, 24528* (type) Ramos, *Bur. Sci. 24890 Edaño*, February and March, 1916, on forested slopes at low altitudes.

This species is manifestly allied to the form described some years ago as *Dimorphocalyx longipes* Merr., which is better placed in *Trigonostemon*. It differs remarkably in its caudate-acuminate, larger leaves and especially in its very prominent, leaf-like bracts. Opportunity is here taken to transfer *Dimorphocalyx longipes* to *Trigonostemon:*

TRIGONOSTEMON LONGIPES (Merr.) comb. nov.

Dimorphocalyx longipes Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 82; Pax & K. Hoffm. in Engl. Pflanzenreich 47 (1911) 33.

LUZON, Province of Bataan, Mount Mariveles, *Whitford 1066, For. Bur. 1801 Borden, For Bur. 17330 Curran:* Province of Laguna, Mount Maquiling, *For. Bur. 13327 Tamesis, For. Bur. 19743 Villamil, For. Bur. 20122 Forestry School:* Province of Rizal, San Isidro and Bosoboso, *Bur. Sci. 13428 Ramos, Merrill 2699.*

ANACARDIACEAE

ONCOCARPUS A. Gray

ONCOCARPUS DENSIFLORUS sp. nov.

Arbor parva, ramulis inflorescentiis fructibusque dense ferrugineo-pubescentibus; foliis subcoriaceis, oblongo-obovatis ad ellipticis, usque ad 15 cm longis, abrupte acuminatis, basi acutis, glabris, supra nitidis, olivaceis, subtus glaucescentibus, pallidis, ad costa nervisque leviter pubescentibus; nervis lateralibus 10 ad 12, patulis, subtus cum reticulis valde prominentibus; paniculis terminalibus, brevibus, anguste pyramidatis, 3 ad 4 cm longis, densissime ferrugineo-villosis; petalis oblongis, extus dense ferrugineo-villosis, intus glabris.

A small tree, the short, terminal, densely flowered panicles and

the fruits uniformly and densely ferruginous-villous. Branches terete, brownish-gray, glabrous, the branchlets rather densely pale brownish- or ferruginous-pubescent, when dry obscurely angled. Leaves subcoriaceous, oblong-obovate to elliptic, 8 to 15 cm long, 4 to 6 cm wide, apex rather abruptly and prominently acuminate, the acumen up to 1 cm in length, blunt, the base acute, the upper surface olivaceous, glabrous, shining when dry, the lower pale, glaucous, sparingly pubescent on the midrib and lateral nerves; lateral nerves 10 to 12 on each side of the midrib, very prominent on the lower surface as are the reticulations, spreading, somewhat curved, uniting directly with the cartilaginous margin; petioles 1 to 1.5 cm long, pubescent. Panicles terminal, narrow, densely flowered, 3 to 4 cm long, all parts very densely ferruginous-villous. Flowers 5-merous. Calyx 3 mm in diameter, the lobes short, ovate, obtuse, less than 1 mm long. Petals 5, free, oblong, 4 mm long, 1.6 mm wide, outside densely ferruginous-villous, inside glabrous, apex obtuse, base narrowed, cuneate. Stamens 5; filaments slender, about 3 mm long. Male flowers with a dense tuft of ferruginous villous hairs in the center. Fruits few, usually 3 or 4 in a panicle, their peduncles about 6 mm long, densely ferruginous-villous, the calyx-tube in fruit about 6 mm long, ovoid-cylindric, the teeth broadly ovate, rounded, about 1.5 mm long, the fruit oblique, when immature about 1.6 cm long, all parts, including the accrecent calyx, densely ferruginous-villous, crowned by the three, short, glabrous styles.

SAMAR, Catubig River, Cagmanaba, *Bur. Sci. 24546 Ramos*, February 29, 1913, in forests at low altitude, locally known as *matapoc*.

A characteristic species manifestly closely allied to *Oncocarpus ferrugineus* C. B. Rob., from which it is easily distinguished by its pubescent branchlets, its fewer-nerved, somewhat smaller leaves, and its short, densely flowered panicles, the young fruits obliquely ovoid or obovoid, scarcely ridged. Probably referable here is *Bur. Sci. 24115 Ramos* from Tagabiran, Catubig River, the leaves of which are more prominently acuminate than in the type, and the branchlets nearly glabrous.

SAPINDACEAE

ALLOPHYLUS Linnaeus

ALLOPHYLUS SAMARENSIS sp. nov.

Frutex subglaber; foliis unifoliolatis, foliolis firme chartaceis, oblongo-ellipticis, usque ad 30 cm longis, utrinque subaequaliter angustatis, basi acutis, apice prominente acuminatis, margine grosse irregulariter lobato-serratis, dentibus acutis; nervis utrinque circiter 11, subtus valde prominentibus cum costa reticulisque

brunneis; petiolo 3.5 ad 5 cm longo; inflorescentiis axiliaribus, petiolo subaequantibus, paucifloris, ramis 1 vel 2, parce pubescentibus.

A subglabrous shrub 1 m high or more, the branches slender, terete, glabrous, lenticellate, grayish-brown. Leaves 1-foliolate, oblong-elliptic, 25 to 30 cm long, 9 to 12 cm wide, firmly chartaceous, shining on both surfaces when dry, quite glabrous or the lower surface obscurely and sparsely puberulent on the midrib and nerves, the upper surface brownish-olivaceous, the lower paler, and nerves, midrib, and reticulations brownish, in rather strong contrast to the surface, subequally narrowed to the acute base and to the prominently acuminate apex, the acumen distantly denticulate, the margins coarsely and irregularly lobed-toothed, sinuses broad, rounded, the teeth acute, up to 1 cm in length, one corresponding to each lateral nerve; lateral nerves about 11 on each side of the midrib, very prominent on the lower surface as are the primary and secondary reticulations; petioles sparingly puberulent, 3.5 to 5 cm long. Inflorescences axillary, somewhat pubescent, about as long as the petioles, with one or two branches. Flowers white, their pedicels 1 to 1.5 mm long. Sepals glabrous or their margins obscurely pubescent, the two outer ones oblong to elliptic, rounded, about 2 mm long and 1 mm wide, the two inner ones orbicular to subreniform, 1.8 to 2 mm long, 2 mm wide. Petals 4, about 1.8 mm long, the limb densely villous inside, subtruncate, triangular-narrowed below, the claw glabrous or nearly so. Stamens 8, their filaments somewhat villous, 1.8 to 2 mm long. Glands prominent, glabrous.

SAMAR, Catubig River, Mount Capatoan, *Bur. Sci. 24402 Ramos*, February 20, 1916, in forests, locally known as *hampapangiay*.

A most characteristic species readily distinguished by its large, coarsely toothed, prominently reticulate, simple leaves and its short, slightly branched inflorescences which are about as long as the petioles. It manifestly belongs in the group of unifoliolate *Allophylus* to which belong the Philippine species *A. unifoliatus* Radlk., *A. simplicifolius* Radlk., and *A. pedunculares* Radlk., but it is distinct from these and from all other described forms.

VITACEAE

LEEA Royen

LEEA UNIFOLIOLATA sp. nov.

Frutex, partibus junioribus inflorescentiisque exceptis glaber; foliis simplicibus, oblongis, chartaceis, usque ad 27 cm longis, acuminatis, basi acutis, margine crenato-dentatis, nervis utrinque 15 ad 18, subtus valde prominentibus; inflorescentiis subterminalibus, brevibus, confertis, 2 ad 3 cm longis; floribus 4-meris, albis.

A shrub, the younger branchlets somewhat furfuraceous, the inflorescence more or less subferruginous-pubescent, otherwise glabrous or nearly so. Branches terete, dark-colored when dry, the ultimate ones 5 mm in diameter or less. Leaves simple, oblong, chartaceous, 20 to 27 cm long, 8 to 10 cm wide, subequally narrowed to the acute base and to the distinctly acuminate apex, margins distinctly crenate-dentate, the teeth rather small, often glandular, the upper surface dark-olivaceous when dry, slightly shining, the lower much paler, shining; lateral nerves 15 to 18 on each side of the midrib, very prominent, nearly straight, somewhat ascending, anastomosing very close to the margin, the reticulations subparallel, rather close; petioles 3 to 4 cm long. Inflorescence subterminal, short, crowded, 2 to 3 cm long. Flowers 4-merous, white, 6 to 7 mm long. Calyx funnel-shaped or cup-shaped, about 4 mm long, with 4 shallow, rounded lobes, externally slightly pubescent. Corolla-tube about 3 mm long, the lobes 4, reflexed, oblong, acute, 3.5 to 4 mm long. Staminal-tube united with the corolla, exserted about 2 mm above the reflexed petals, crenate. Anthers 4, united with the tube, about 2 mm long. Ovary ovoid, glabrous; style 1.2 mm long.

SAMAR, Catubig River at Pinipisakan, *Bur. Sci. 24873 Edaño*, March 20, 1916, in swampy places along streams at low altitudes.

A most characteristic species, readily distinguished among the unifoliolate species of *Leea* by its oblong, numerously nerved leaves, its short. crowded inflorescences, and its 4-merous flowers. It is apparently allied to *Leea simplicifolia* Z. & M., but is totally different from all known Philippine forms.

TILIACEAE

GREWIA Linnaeus

GREWIA INFLEXA sp. nov.

Arbor, inflorescentiis exceptis glabra vel subglabra; foliis subcoriaceis, oblongo-ovatis ad ovato-ellipticis, usque ad 19 cm longis, breviter obtuseque acuminatis, basi rotundatis vix vel obscure 3-nerviis, olivaceis, nitidis, nervis utrinque 7 vel 8, prominentibus; paniculis axillaribus terminalibusque, usque ad 9 cm longis, prominente simpliciter hirsutis; floribus involucratis, sepalis oblongo-spatulatis, minute tomentosis, circiter 8 mm longis, margine inflexis, petalis nullis.

A tree, nearly glabrous except the prominently hirsute inflorescence and puberulent or tomentose flowers. Branches brownish, terete, glabrous, the younger ones sparingly hirsute with scattered spreading hairs. Leaves subcoriaceous, oblong-ovate to ovate-elliptic, 13 to 19 cm long, 7 to 9 cm wide, olivaceous and shining when dry, the lower surface somewhat brownish, the apex

rather prominently but widely and obtusely acuminate, base rounded, equilateral or nearly so, not or but obscurely 3-nerved, glabrous on both surfaces; lateral nerves 7 or 8 on each side of the midrib, prominent, curved, obscurely or scarcely anastomosing, the reticulations slender, the basal pair scarcely different from the next pair above and not extending to beyond one-fourth or one-third the length of the leaf; petioles 8 to 14 mm long, densely hirsute with simple hairs; stipules oblong, glabrous or slightly pubescent, obtuse, about 7 mm long. Panicles axillary and terminal, rather narrow, up to 9 cm in length, the rachis and branches prominently and densely subferruginous-hirsute with spreading simple hairs, the bracts subtending the branches similar to the stipules but slightly smaller. Flowers in groups of threes terminating the branchlets, each group subtended by an involucre of irregular, ovate to oblong, deciduous, densely puberulent, about 6 mm long bracts, these usually also supplied with a few long, spreading simple hairs externally. Flowers yellow, their tomentose pedicels about 2 mm long. Sepals densely puberulent-tomentose, about 8 mm long, oblong-spatulate, obtuse, margins strongly inflexed throughout. Petals none. Torus short, glabrous below, the margins villous. Stamens about 45, their filaments 4 to 5 mm long. Ovary narrowly-ovoid, about 1.3 mm long, puberulent; style slender, glabrous, about 4 mm long.

SAMAR, Catubig River, at Tagabiran and Mount Capatoan, *Bur. Sci. 24466* (type), *24489 Ramos*, February, 1916, in forests along small streams and on damp slopes at low altitudes. A narrow-leaved form is represented by *Sablaya 17*, from the same region.

The alliance of this species is apparently with *Grewia stylocarpa* Warb., from which it is at once distinguished by its more numerously nerved leaves, which are not or but very obscurely 3-nerved at the base, and its hirsute inflorescences. Superficially it very closely resembles a series of specimens from the Malay Peninsula representing *Grewia latifolia* Mast., but the indumentum of the inflorescence in that species is short and stellate, not of simple hairs, while the floral structure is entirely different.

STERCULIACEAE

STERCULIA Linnaeus

STERCULIA RAMOSII *sp. nov.*

Arbor alta, ramulis incrassatis, 1 ad 1.5 cm diametro; foliis ovatis, integris, subcoriaceis, brevissime acuminatis, basi subtruncato-rotundatis vix cordatis, 7- vel 9-nerviis, usque ad 25 cm longis, supra glabris, nitidis, subtus pallidioribus, minutissime stellato-puberulis, nervis lateralibus utrinque circiter 10; pani-

culis axillaribus, usque ad 35 cm longis, densissime velutinis, angustis; floribus ♂ infundibuliformibus, circiter 6.5 mm longis, lobis oblongo-ovatis, liberis, acutis, rubris, in siccitate purpureis, extus velutinis, intus dense villosis.

A tall tree, the trunk said to be about 1 m in diameter, the branches and branchlets terete, brown, the latter 1 to 1.5 cm in diameter, marked with large petiolar scars, puberulent. Leaves crowded at the ends of the branchlets, ovate, entire, subcoriaceous, 15 to 25 cm long, 10 to 17 cm wide, the upper surface greenish-olivaceous when dry, glabrous, shining, the lower paler, minutely stellate-puberulent, the minute tufts of hairs scattered, the indumentum not covering the entire surface, apex abruptly and very shortly acuminate, the base truncate-rounded, not cordate, 7- or 9-nerved; lateral nerves about 10 on each side of the midrib, prominent; stipules few, linear, accuminate, deciduous, about 5 mm long; petioles 3 to 12 cm long, puberulent, ultimately glabrous. Panicles axillary, rather numerous, narrow, up to 35 cm in length, all parts densely velutinous with pale-brownish or purplish hairs, the branches scattered, spreading, the lower ones up to 7 cm in length, rather few flowered. Flowers red when fresh, usually purplish when dry, funnel-shaped, 6 to 7 mm long, outside densely velutinous, inside densely villous, the lobes 5, oblong-ovate, acute, 2.5 mm long. Staminal column slender, about 3 mm long; anthers about 10, forming a globose head about 1 mm in diameter.

SAMAR, Catubig River at Cagmanaba, *Bur. Sci. 24549 Ramos* (type), February 28, 1916. LUZON, Province of Camarines, Sagnay, *Bur. Sci. 22138 Ramos*, December 17, 1913, in damp forests at low altitudes, locally known in Samar as *palapangui*.

A species well characterized by its thickened branches, few stipules, rather large, ovate, shortly acuminate, entire leaves which are minutely stellate-puberulent on the lower surface with scattered hairs, and its elongated, lax, densely velutinous panicles. It is perhaps as closely allied to *Sterculia wigmanni* Hochr. as to any other species, but it has very much larger flowers, a different indumentum, and different leaves.

THEACEAE

TERNSTROEMIA Mutis

TERNSTROEMIA PHILIPPINENSIS sp. nov.

Arbor glabra, circiter 15 m alta; foliis crasse coriaceis, nitidis, in siccitate brunneis vel olivaceis, oblongis ad oblongo-oblanceolatis, usque ad 25 cm longis, breviter obtuseque acuminatis, basi angustatis, cuneatis, nervis utrinque circiter 12, indistinctis, pagina inferiore nigro-puncticulatis vel glandulosis; floribus

axillaribus, pedunculis mediocris, 1.5 ad 2.5 cm longis, sepalis petalisque crasse coriaceis; fructibus ovoideis, circiter 7 cm longis; seminibus magnis, oblongis, circiter 4 cm longis.

A tree about 15 m high, entirely glabrous. Branches terete, grayish or brownish, the ultimate ones 5 to 7 mm in diameter. Leaves very thickly coriaceous, oblong to oblong-oblanceolate, or oblong-obovate, 12 to 25 cm long, 4 to 7.5 cm wide, usually dark-brown when dry, sometimes olivaceous, apex shortly and broadly acuminate, base gradually narrowed, cuneate, the lower surface distinctly and minutely black-glandular or puncticulate, sometimes minutely verruculose; lateral nerves about 12 on each side of the midrib, slender, indistinct; petioles stout, 1 to 3 cm long. Flowers axillary, solitary, rather numerous, their pedicels stout, 1.5 to 2.5 cm long. Buds globose, when nearly or quite mature about 1.5 cm in diameter, the sepals orbicular, thickly coriaceous, about 1 cm long. Fruits ovoid, brown when dry, smooth, about 7 cm long and 5 cm in diameter, rounded, the much thickened calyx-lobes persistent, the peduncles not elongated. Seeds oblong, rounded at both ends, about 4 cm long and 2 cm wide.

LUZON, Province of Cagayan, near Aparri, *For. Bur. 15245 Bernardo*, May, 1910: Province of Nueva Vizcaya, Imugan, *For. Bur. 10876 Curran*, December, 1908: Province of Laguna, San Antonio, *Bur. Sci. 20477 Ramos*, (type) February 26, 1913: Province of Rizal, Bosoboso, *Merrill 2692*, June 1903: Province of Camarines, *For. Bur. 10642 Curran*, *For. Bur. 14261 Aguilar*, June, April, 1909. MINDORO, south of Lake Naujan, *For. Bur. 6856 Merritt*, April, 1907. SAMAR, Catubig River, *Sablaya 78*, February, 1916.

This species occurs in the virgin forest at altitudes varying from 15 to 1,200 meters, depending on the region in which it grows. It is well characterized by its comparatively large, thickly coriaceous leaves, and its very large fruits. It differs from *Ternstroemia megacarpa* Merr. in its somewhat smaller leaves, and its much shorter flowering and fruiting peduncles. Local names are given as *arana* (Bicol, Camarines); *barangoy* (Tagalog, Rizal), and *hindang* and *pamentugon* (Visayan, Samar).

GUTTIFERAE

GARCINIA Linnaeus

GARCINIA SAMARENSIS sp. nov. § *Oxycarpus* (?).

Arbor circiter 12 m alta, glabra, ramis ramulisque tenuibus, in siccitate purpureo-brunneis, teretibus vel ramulis obscure angulatis; foliis membranaceis, oblongis, acuminatis, basi acutis, usque ad 9 cm longis, olivaceis, nitidis, nervis utrinque circiter 15, tenuibus; floribus ♂ axillaribus, solitariis vel binis, longe pedicellatis, 4-meris; sepalis suborbicularis, membranaceis, 2.5 mm diametro; petalis oblongis, obtusis, circiter 6.5 mm longis;

antheris numerosis, sessilibus, orbicularis, 2-locellatis, in receptaculum integrum dense confertis. Ovarium rudimentum nullum.

A tree about 12 m high, entirely glabrous, the branches and branchlets slender, dark purplish-brown when dry, terete, or the latter obscurely angled. Leaves oblong, membranaceous, shining, olivaceous, 5 to 9 cm long, 2 to 3 cm wide, subequally narrowed to the acute base and to the rather slenderly blunt-acuminate apex; lateral nerves about 15 on each side of the midrib, very slender, anastomosing, the reticulations lax; petioles slender, 5 to 8 mm long. Staminate flowers axillary, 4-merous, solitary or in pairs, their pedicels slender, somewhat thickened upward, about 1 cm long, each subtended by a pair of linear-lanceolate, acuminate, 1.5 mm long bracteoles. Buds globose. Sepals 4, equal, orbicular or suborbicular, rounded, margins minutely and obscurely ciliate, about 2.5 mm in diameter. Petals 4, in anthesis oblong, spreading, rounded, subcoriaceous, 6 to 7 mm long, 2.5 to 3.5 mm wide. Anthers about 40, on all sides of the entire receptacle, orbicular, 0.5 mm in diameter, 2-celled, laterally dehiscent. Rudimentary ovary none.

SAMAR, Catubig River, Mount Capotoan, *Bur. Sci. 24452 Ramos*, February 20, 1916, along small streams in damp forests.

A species well characterized by its membranaceous leaves and its solitary or paired, long-pedicelled, staminate flowers. It does not appear to be closely allied to any previously described form.

GARCINIA MACGREGORII sp. nov. § *Oxycarpus, Cowa.*

Arbor glabra, 10 ad 15 m alta, ramis ramulisque teretibus; foliis oblongis, membranaceis, olivaceis, nitidis, utrinque subaequaliter angustatis, basi acutis, apice prominente acuminatis, usque ad 12 cm longis, nervis primariis utrinque circiter 10, subtus distinctis, anastomosantibus; floribus axillaribus, fasciculatis, pedicellatis, 4-meris; ♂ antheris circiter 25, oblongo-obovoideis, 0.6 mm longis, in receptaculum integrum dense confertis, ovarium rudimentum nullum; ♀ ovario 5-loculare, stigma prominente papillata.

A glabrous tree 10 to 15 m high, the branches and branchlets rather slender, terete, reddish-brown. Leaves membranaceous, generally oblong, sometimes oblong-elliptic, olivaceous, shining, 9 to 12 cm long, 1.5 to 5 cm wide, glandular-punctate, subequally narrowed to the acute base and to the prominently acuminate apex, the acumen usually about 1 cm long, blunt; lateral nerves about 10 on each side of the midrib, slender, distinct, curved, anastomosing, the secondary veins and primary reticulations

rather distinct. Staminate flowers numerous, their pedicels 2 to 3 mm long, axillary, fascicled. Sepals 2 mm long, ovate, rounded. Petals subcoriaceous, oblong-elliptic, rounded, 4 mm long. Anthers about 25, oblong-obovoid, 0.6 mm long, crowded on the flat receptacle. Rudimentary ovary none. Pistillate flowers axillary and terminal, solitary or fascicled, sometimes on a short peduncle, their pedicels 2 to 3 mm long. Sepals broadly orbicular-ovate to subreniform, rounded, 1.5 mm long. Ovary depressed-globose, 5-celled. Rudimentary stamens about 12, their filaments free or nearly so, flattened, 1 mm long. Stigma obscurely 5-lobed, rounded, about 2 mm in diameter, prominently papillate. Fruit immature, apparently globose, fleshy, black when dry, 1.5 cm in diameter or more.

SAMAR, Catubig River (Palapag) *Bur. Sci. 24279 Ramos* (type), March 12, 1916, *Sablaya 59*. BILIRAN, *Bur. Sci. 18551 McGregor*, June, 1914, in forests, altitude about 300 meters.

The alliance of this species appears to be with *Garcinia nigro-lineata* Planch., from which, however, it is distinguished by numerous characters, notably in its much fewer lateral nerves.

FLACOURTIACEAE

HOMALIUM Jacquin

HOMALIUM SAMARENSE sp. nov. § *Myriantheia*.

Arbor circiter 10 m alta, inflorescentiis prominente ciliatis exceptis glabra; foliis ellipticis vel oblongo-ellipticis, usque ad 10 cm longis, coriaceis vel subcoriaceis, in siccitate nitidis, brunneis vel olivaceo-brunneis, basi acutis ad subrotundatis, apice breviter acute acuminatis, margine distanter crenato-serratis, dentibus subtus glandulosis, nervis utrinque circiter 6, subtus prominentibus; inflorescentiis terminalibus, ramis paucis, elongatis, valde ciliatis; floribus 6-meris, sepalis linearis, 4 ad 5 mm longis; petalis anguste spatulatis, sepalis aequantibus, ciliatis; staminibus 18.

A tree about 10 m high, glabrous except the prominently ciliate inflorescence. Branches terete, slender, lenticellate, brownish-gray. Leaves mostly brown when dry or the upper surface brownish-olivaceous, shining, coriaceous or subcoriaceous, elliptic to oblong-elliptic, 7 to 10 cm long, 3.5 to 5 cm wide, base rounded to acute, apex shortly acute-acuminate, margins distantly crenate-serrate, each tooth with a gland on the lower surface; lateral nerves about 6 on each side of the midrib, prominent, anastomosing, the reticulations distinct; petioles 5 to 8 mm long. Racemes terminal, sometimes solitary, sometimes arranged in a depauperate panicle supplied with reduced

leaves, up to 10 cm long, prominently ciliate with long, spreading, pale hairs. Flowers white, 6-merous, scattered, not fascicled, along the rachis, their prominently ciliate pedicels about 3 mm long, jointed to the calyx, the flower readily falling, the subtending bracts linear-lanceolate, 2.5 to 3 mm long, ciliate. Calyx-tube funnel-shaped, about 2 mm long. Sepals 6, linear, 4 to 5 mm long, ciliate. Petals 6, narrowly spatulate, ciliate, as long as the sepals. Stamens 3 opposite each petal, their filaments 5 mm long, prominently ciliate in the lower one-half. Ovary ovoid, ciliate; styles 6, about 5 mm long, hirsute-ciliate in the lower one-half with spreading hairs.

SAMAR, Catubig River, *Bur. Sci. 24188 Ramos*, in damp forests at low altitudes, February 13, 1916.

Most closely allied to *Homalium villarianum* Vid., from which it is readily distinguished by its sepals not being at all spatulate but linear, as well as by other characters.

LECYTHIDACEAE

PETERSIANTHUS nomen novum

(*Petersia* Welw., 1867, non Klotzsch, 1861)

PETERSIANTHUS QUADRIALATUS (Merr.) comb. nov.

Terminalia quadrialata Merr. in Philip. Journ. Sci. 4 (1909) Bot. 301.

MASBATE, *Bur. Sci. 12558 Rosenbluth*, type, in fruit, *Bur. Sci. 12814, 12597* (fruits and seedlings), *12562* (old fruits), *12583 Rosenbluth*. SAMAR, *Bur. Sci. 24146 Ramos*, February, 1916, *For. Bur. 24746 Phasis*, November 19, 1915, both in flower, *For. Bur. 12874, 12617 Rosenbluth*, both sterile. LUZON, Province of Sorsogon, *For. Bur. 4526 Zschokke*, May, 1906, with old fruits. MINDANAO, Subprovince of Butuan, *For Bur. 18865 Varian, For. Bur. 7556 Hutchinson, Sherfesee s. n.*, all sterile.

This species is widely distributed in the central and southern Philippines, and is widely known as *toog* (Sorsogon, Samar, Masbate, and Butuan). The tree reaches an enormous size, one cut and measured at Amparo, Butuan Subprovince by Mr. Varian, presenting a trunk with a diameter of 186 cm at 2 meters above the ground, and a length of 35 meters to the first branch.

The species was first described from fruiting specimens and was erroneously placed in *Terminalia*. Now that flowers are available for study, it is clearly referable to the African genus *Petersia* Welw., which I have here renamed *Petersianthus*, as *Petersia* is a name preoccupied by Klotzsch's genus of the *Capparidaceae*. A description of the flowers is as follows:

Inflorescence terminal, peduncled, corymbose-paniculate, including the peduncle, about 10 cm long, sometimes supplied with dwarfed leaves. Flowers white, their pedicels about 3 mm long. Calyx-tube sharply 4-angled or narrowly 4-winged, gradually enlarged upward, about 6 mm long, the lobes 4, alternate with the angles, orbicular, rounded, imbricate, 4 to 5 mm in diameter. Petals 4, orbicular-ovate, rounded, about 1 cm

long. Stamens many-seriate, subequal, their filaments up to 1 cm in length; anthers elliptic, longitudinally 2-celled, 1 to 1.2 mm long, opening by longitudinal slits. Ovary inferior, 4-celled; ovules several seriate, axile; style slender, about 6 mm long.

The discovery of a third species of this typically African genus, in the Philippines, while unexpected, is by no means the only case of special extra-African distribution presented by the Philippine flora. We have in the Philippines one representative of the almost exclusively African genus *Angraecum* (*A. philippinense* Ames), and one representative of the almost exclusively African and Madagascar genus *Erythrophloeum* (*E. densiflorum* Merr.).

The other known species of *Petersianthus* are:

PETERSIANTHUS AFRICANUS (Welw.) comb. nov.

Petersia africana Welw. ex Benth. & Hook. f. Gen. Pl. 1 (1867) 721.

PETERSIANTHUS MINOR (Niedenzu) comb. nov.

Petersia minor Niedenzu in Engl. & Prantl Nat. Pflanzenfam. 3 (1892) 31, *f. 12.*

MYRTACEAE

EUGENIA Linnaeus

EUGENIA TULANAN sp. nov. § *Eueugenia.*

Arbor circiter 15 m alta, glabra, ramis ramulisque teretibus; foliis oppositis, coriaceis vel subcoriaceis, in siccitate olivaceis vel pallide brunneis, ellipticis at oblongo-ellipticis, usque ad 9 cm longis, breviter obtuseque acuminatis, basi acutis, tenuiter triplinerviis, subtus parce puncticulatis, nervis lateralibus utrinque 6 ad 8, tenuibus, anastomosantibus, reticulis obscuris; floribus axillaribus vel e axillis defoliatis, solitariis vel fasiciculatis, brevissime pedicellatis, circiter 2.5 cm diametro, calycis lobis subpersistentibus, patulis, glandulosis, orbiculari-ovatis, rotundatis, circiter 6.5 mm diametro.

A tree about 15 m high, entirely glabrous, or the inflorescence very obscurely pubescent. Branches and branchlets terete, smooth, pale or brownish when dry, slender. Leaves opposite, coriaceous or subcoriaceous, olivaceous or pale-brownish when dry, shining, the lower surface sparingly puncticulate, paler than the upper, 5 to 9 cm long, 3 to 4.5 cm wide, elliptic to oblong-elliptic, subequally narrowed to the acute base and to the shortly blunt-acuminate apex, the base 3-plinerved, the nerves slender, distant about 5 mm from the margins, continuing to the apex; lateral nerves 6 to 8 on each side of the midrib, slender, anastomosing with the marginal nerves, the reticulations obscure; petioles 4 to 5 mm long. Flowers white, fragrant, axillary or in the axils of fallen leaves, solitary or fascicled, their pedicels short, stout, about 1.5 mm long, jointed to the pseudo-stalk; bracteoles ovate, slightly pubescent, 1.5 mm long. Calyx-tube,

including the pseudo-stalk, about 4 mm long, narrow below, above abruptly widened and 6 to 7 mm in diameter, the lobes glandular-punctate, in anthesis sparingly ciliate on the margins, orbicular-ovate, rounded, spreading, subpersistent or persistent. Petals 4, about 1 cm long, elliptic to elliptic-obovate, rounded, rather prominently nerved. Stamens indefinite, their filaments about 1 cm long.

SAMAR, Catubig River at Pinipisakan and at Palapag, *Bur. Sci. 24453* (type), *24421 Ramos*, March, 1916, in damp forests at low altitudes, locally known as *tulanan*, the wood very hard.

The alliance of this species is with *Eugenia aherniana* C. B. Rob. from which it is readily distinguished by its glabrous or nearly glabrous inflorescence and much larger flowers. From *Eugenia kamelii* Merr. it is readily distinguished by its much smaller leaves and by numerous other characters.

LOGANIACEAE

STRYCHNOS Linnaeus

STRYCHNOS WENZELII sp. nov.

Frutex scandens, inflorescentiis leviter adpresse ferrugineo-pubescentibus exceptis glaber; foliis chartaceis, in siccitate utrinque castaneis valde nitidisque, ellipticis ad oblongo-ellipticis, usque ad 15 cm longis, breviter acuminatis, basi subacutis ad rotundatis, 5-pli- vel 5-nerviis; inflorescentiis axillaribus, pedunculatis, 1.5 ad 3 cm longis; floribus 3 mm longis, extus glabris, lobis intus ad basin linea dense hirsuta instructis; antheris basi leviter barbatis; fructibus ellipsoideis, brunneis, laevis, nitidis, circiter 1 cm longis, monospermis.

A scandent shrub, attaining a length of 10 m, entirely glabrous except the sparingly appressed ferrugineous-pubescent inflorescence. Branches and branchlets slender, terete, smooth, shining, dark-brown when dry. Leaves chartaceous, elliptic to oblong-elliptic, 7 to 15 cm long, 4 to 8 cm wide, when dry chestnut-brown and strongly shining on both surfaces, base acute to rounded, apex shortly blunt-acuminate; basal nerves 5, the inner pair more prominent than the outer, all leaving the midrib at or near the base or the inner pair up to 1 cm above the base, the reticulations lax, distinct; petioles 5 to 8 mm long. Cymes axillary, peduncled, including the peduncle 1.5 to 3 cm long, sparingly appressed-ferruginous-pubescent, the bracts 2 to 2.5 mm long, the bracteoles smaller. Flowers green and white, rather numerous, 5-merous, their pedicels about 2 mm long. Sepals broadly ovate, rounded or slightly apiculate, about 1 mm long, margins slightly ciliate. Corolla-tube about 1.8 mm long, glabrous, the lobes oblong-ovate, obtuse, about 1.2 mm long,

glabrous outside, inside at the throat supplied with a dense line of stiff hairs about as long as the lobe. Anthers 1 mm long, base sparingly retrorse-bearded. Ovary ovoid, glabrous, somewhat longer than the style. Fruit ellipsoid, brown, smooth, shining when dry, about 1 cm long, the pericarp crustaceous. Seed solitary, somewhat hemispheric, flattened on one side, about 8 mm long.

LEYTE, near Tacloban, *Wenzel 1319* (type), *1569*, and two sheets without number, flowering in June, fruiting in February, 1915. SAMAR, Catubig River at Mount Capatoan, *Bur. Sci. 24381 Ramos*, February 20, 1916, in fruit.

The species grows in forests at low and medium altitudes, and is known in Samar as *mara igasud*, and in Leyte as *igasud*, the latter being the proper name of the entirely different *Strychnos ignatii* Berg. *Strychnos wenzelii* Merr. is a very distinct and characteristic species, readily distinguishable by its castaneous, strongly shining leaves, and its small, one-seeded fruits. Its alliance is with *Strychnos horsfieldiana* Miq., from which, however, it differs in many details, its leaves not attenuate-acuminate, 5-nerved rather than 3-nerved, quite glabrous beneath, its glabrous branches and branchlets, and its corolla entirely glabrous externally.

VERBENACEAE

PREMNA Linnaeus

PREMNA STELLATA sp. nov.

Arbor 5 ad 10 m alta, subtus foliis ad costa nervisque petiolis inflorescentiisque plus minusve cinereo- vel subferrugineo- simpliciter stellato-tomentosis; foliis chartaceis, ovatis ad oblongo-ovatis, usque ad 20 cm longis, integris, nitidis, apice abrupte acuminatis, basi late rotundatis ad subtruncatis, nervis utrinque 4 ad 6, subtus valde prominentibus; inflorescentiis terminalibus, corymbosis, pedunculatis, usque ad 11 cm latis; floribus extus stellato-tomentosis, calycis obscure bilabiatis, subaequaliter 5-dentatis; corolla 5 mm longa, labium superius cucullatum, orbiculari-rotundatum, usque ad 2.5 mm diametro, inferius trifidum.

A tree 5 to 10 m high, the branchlets densely stellate-tomentose, the leaves on the lower surface, especially on the midrib and lateral nerves rather sparingly so, the inflorescence distinctly, and when young, densely stellate-tomentose. Branches terete, or the younger ones compressed, pale-brownish, glabrous, the branchlets stellate-tomentose, all the hairs stellate, no plumose and no simple ones intermixed. Leaves chartaceous, pale or olivaceous when dry, somewhat shining, ovate to oblong-ovate, entire, 9 to 20 cm long, 7 to 12 cm wide, the apex abruptly acuminate, the acumen blunt or acute, 1 cm long or less, the base broadly rounded or subtruncate, not cordate, the upper

surface glabrous, or the midrib and lateral nerves slightly stellate-tomentose; lateral nerves 4 to 6 on each side of the midrib, very prominent on the lower surface, somewhat ascending, anastomosing, the reticulations distinct; petioles 2.5 to 6 cm long, stellate-tomentose. Panicles terminal, corymbose, peduncled, up to 11 cm in diameter, the lower branches 4 to 6 cm in length. Flowers white, numerous but not crowded, the subtending bracteoles linear, 1 to 2 mm long, the bracts similar but much larger, the pedicels 1 to 2 mm long, jointed to the calyx. Calyx cup-shaped, about 3 mm long, externally rather densely stellate-tomentose with cinereous hairs, obscurely 2-lipped, subequally 5-toothed, the teeth 0.5 to 0.8 mm long, acute. Corolla 5 mm long, the upper part externally stellate-tomentose, eglandular, 2-lipped, the upper lip entire, rounded, cucullate, suborbicular, 2 to 2.5 mm in diameter, the lower 3-lobed, the central lobe elliptic-ovate, rounded, about 1.8 mm long, the two lateral ones slightly shorter. Ovary tomentose. Filaments glabrous. Fruit ellipsoid-obovoid, about 4 mm long, when young stellate-tomentose, ultimately glabrous.

SAMAR, Catubig River, *Bur. Sci. 24262 Ramos* (type), February 7, 1916, *Sablaya 96;* Catarman, *For. Bur. 12643 Rosenbluth,* April 9, 1909, along streams in forests at low altitudes, locally known as *manaba.*

A species manifestly allied to *Premna cumingiana* Schauer, from which it is readily distinguished by its simply stellate, comparatively sparse indumentum. In *Premna cumingiana* the indumentum on many parts is distinctly plumose, while on some parts the plumose hairs are intermixed with much longer simple ones; the lower surface of the leaves is very densely and uniformly covered with indumentum, while in the present species the indumentum is practically confined to the midrib and lateral nerves. *Premna stellata* Merr. is also closely allied to the Javanese form that has been referred to *Premna tomentosa* Willd., the oldest name for which appears to be *Cornutia corymbosa* Burm., based on Ceylon specimens. It is not the same as the Javan plant, however, differing in its abruptly acuminate, fewer-nerved leaves. It is also sufficiently distinct from the Asiatic *Premna pyramidata* Wall.

ACANTHACEAE

HEMIGRAPHIS Nees

HEMIGRAPHIS OBLONGIFOLIA sp. nov.

Caulis simplicibus, rariter ramosis, infra prostratis, radicantibus, usque ad 25 cm altis, prominente patule ciliatis; foliis in paribus aequalibus, oblongis, membranaceis, usque ad 8 cm longis, obtusis, basi rotundatis ad leviter cordatis, margine grosse crenatis, utrinque plus minusve ciliatis vel ciliato-setosis; inflorescentiis axillaribus terminalibusque, tenuiter pedunculatis,

bracteis parce ciliato-hirsutis, spatulatis, circiter 1 cm longis; sepalis lineari-lanceolatis, tenuissime acuminatis, ciliato-setosis, 7 ad 8 mm longis; corolla circiter 1 cm longa.

A rather slender, simple, rarely branched, prominently pubescent annual attaining a height of 25 cm, the stem prostrate below, rooting at the nodes, prominently ciliate with elongated, spreading, rather pale, weak, crisped or jointed hairs. Leaves of each pair equal or subequal, mostly oblong, rarely ovate or ovate-oblong, membranaceous, olivaceous when dry, dull or somewhat shining, 3 to 8 cm long, 1.5 to 3 cm wide, apex rounded or obtuse, base abruptly rounded or truncate, sometimes slightly cordate, both surfaces supplied with numerous, long, rather weak, spreading hairs, margins prominently and rather coarsely crenate; petioles ciliate, 5 to 25 mm long. Inflorescences axillary and terminal, their peduncles slender, ciliate, 1.5 to 7 cm long, the flowers white, rather few, crowded near the top of the peduncle; bracts spatulate, obtuse, narrowed below, about 1 cm long, the lowermost ones often larger and foliaceous, ciliate or ciliate-setose with long, scattered, spreading hairs. Sepals 5, linear-lanceolate, slenderly long-acuminate, 7 to 8 mm long, sparingly ciliate with long, slender, white or pale hairs. Corolla about 1 cm long, glabrous. Capsule narrowly oblong, 8 to 9 mm long, about 1.8 mm in diameter, glabrous or very slightly puberulent.

SAMAR, Catubig River at Caminiuan and at Palapag, *Bur. Sci. 24240* (type), *24185*, *24301 Ramos*, February and March, 1916, in damp forests at low altitudes.

A species well characterized by its oblong, crenate leaves and its indumentum.

RUNGIA Nees

RUNGIA MEMBRANACEA sp. nov.

Annua, usque ad 35 cm alta, caulibus infra prostratis, radicantibus; foliis membranaceis, lanceolatis usque ad 9 cm longis, basi acutis vel acuminatis, sursum gradatim angustatis, apice obtusis, lineolatis, glabris, vel subtus ad costa plus minusve hirsutis, nervis utrinque 5 vel 6, distinctis, adscendentibus, anastomosantibus; spicis axillaribus terminalibusque, solitariis ad trinis, usque ad 3 cm longis, bracteis haud marginatis, orbiculari-ovatis ad late obovatis, abrupte brevissime acuminatis, reticulatis, margine leviter ciliatis; bracteolis oblongo-lanceolatis, circiter 5 mm longis, anguste acuminatis, margine parce ciliatis; calycis segmentis anguste lanceolatis, acuminatis, ciliatis, circiter 3.5 mm longis.

An annual, simple or sparingly branched, nearly glabrous herb

35 m high or less, the stems sparingly pubescent, the lower parts prostrate and rooting at the nodes. Leaves membranaceous, lanceolate, greenish when dry, 6 to 9 cm long, 1.5 to 2.5 cm wide, base acute or acuminate, gradually narrowed upward to the blunt apex, margins slightly undulate, both surfaces with numerous small cystoliths, glabrous, or the midrib on the lower surface more or less hirsute with short hairs; lateral nerves 5 or 6 on each side of the midrib, distinct, ascending, anastomosing; petioles 8 to 20 mm long. Spikes terminal and axillary, solitary or in threes, shortly peduncled, up to 3 cm long. Bracts submembranaceous, green, not margined, orbicular-ovate to broadly obovate, 6 to 7 mm in diameter, or the obovate ones up to 8 mm in length, their margins sparingly ciliate, apex abruptly and very shortly acuminate; bracteoles oblong-lanceolate, slenderly acuminate, margins sparingly ciliate, about 5 mm long. Calyx segments narrowly lanceolate, acuminate, ciliate, about 3.5 mm long. Corolla sparingly pubescent externally.

SAMAR, Catubig River at Tagabiran, *Bur. Sci. 24515 Ramos*, February, 1916, in open forests at low altitudes.

A characteristic species distinguished by its membranaceous leaves and its relatively very broad bracts, which are abruptly short-acuminate and not at all margined as in most other species of the genus.

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PIPERACEAE PHILIPPINENSES NOVAE VEL NUPER REPERTAE [1]

Auctore C. DE CANDOLLE
(*Geneva, Switzerland*)

Sectio **Muldera** Hook. f. Fl. Brit. Ind. **5** (1886) 79

PIPER SARCOPODUM C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo ovato-acuminato basi leviter inaequilatera utrinque obtuso apice acute acuminato, 7-plinervio, nervo centrali nervos 2 adscendentes alternos mittente quorum supremus a 1.5–2 cm supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis, petiolo basi vaginante; stirpis fem. pedunculo glabro petiolum superante, spica glabra limbum aequante vel paullo superante, receptaculo cupuliformi in apice stipitis recti et crassi, bacca globosa, stigmatibus 4 minutis rotundatis.

Dioicum. Ramuli in sicco nigri, spiciferi 3 mm crassi, collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus centralis pluresque peripherici. Limbi in sicco firmi opaci, 9–10 cm longi, 5–6 cm lati. Petioli usque ad limbi latus longius 1.1 cm, inter limbi latera 0.2 cm, pedunculi 2 cm longi, bacca matura 4 mm crassa in sicco nigra.

LUZON, Laguna Province, *Bur. Sci. 16536 Ramos*, in forests near streams.

Sectio **Sarcostemon** C. DC. in Philip. Journ. Sci. **5** (1910) Bot. 413

PIPER KORTHALSII Miq. in Ann. Mus. Bot. Lugd. Bat. 1 (1863) 39.

LUZON, Benguet Subprovince, *Merrill 7805*, on trees in ravines, altitude about 1,500 *m*, stems angular, flowers greenish-yellow: Bontoc Subprovince,

[1] The species are arranged in sequence with those in my previous paper on Philippine Piperaceae, *Philip. Journ. Sci.* **5** (1910) *Bot.* 405–463. the new species being interpolated according to their relationships.

143573

Vanoverbergh 1178, vine 3 m high in forests, altitude 1,650 m: Ifugao Subprovince, Mount Polis, *Bur. Sci. 19814 McGregor:* Cagayan Province, *Weber 1567, Bur. Sci. 13881 Ramos, For. Bur. 19559 Curran:* La Union Province, Castillo, *Loher 4522:* Laguna Province, San Antonio, *Bur. Sci. 16535 Ramos*, fruit reddish-yellow.

Sectio **Eupiper** C. DC. Prodr. 16[1] (1869) 339

PIPER COSTULATUM C. DC. in Elm. Leafl. Philip. Bot. 3 (1910) 760; Philip. Journ. Sci. 5 (1910) Bot. 420.

LUZON, Nueva Vizcaya Province, *Bur. Sci. 20071 McGregor.*

PIPER MINIATUM Blume in Verh. Bat. Genoots. 11 (1826) 166.

LUZON, Rizal Province, Montalban, *Loher 6812.* SAMAR, *Bur. Sci. 17439, 17575, 17645 Ramos.* LEYTE, *Bur. Sci. 15256 Ramos.* BASILAN, *Bur. Sci. 15466 Reillo.*

Forma b C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 422.

SAMAR, *Bur. Sci. 17586 Ramos.* LEYTE, *Wenzel 721, 866.*

Forma c C. DC. l. c. 422.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 12018, 14998 Ramos*, on trees; Mount Banajao, *Elmer "A,"* much branched, in clumps, fruit brownish-red. SAMAR, *Bur. Sci. 17586 Ramos.* BILIRAN, *Bur. Sci. 18856 McGregor*, in forests, altitude 500 m, fruit red. LEYTE, *Wenzel 914.* MINDANAO, Bukidnon Subprovince, *Bur. Sci. 15747 Fénix.*

PIPER FRAGILE C. DC. β **MULTINERVE** C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 421.

LUZON, Tayabas Province, Mount Pular, *Bur. Sci. 19426 Ramos.*

PIPER VARIBRACTEUM C. DC. in Elm. Leafl. Philip. Bot. 3 (1910) 764.

Emend. lege:Baccis inferne in rhachi immersis.

PIPER ATROSPICUM C. DC. **sp. nov.**

Ramulis glabris leviter costulatis; foliis modice petiolatis glabris, limbo elliptico-lanceolato basi ima inaequilatera acuto lateribus aequilongis inaequilatis, apice acute acuminato, 6-nervio, nervis lateralibus altero latere 2 altero 3, petiolo fere usque ad medium vaginante; stirpis fem. pedunculo glabro petiolum multo superante, spica in sicco atronigra quam limbus pluries breviore apice obtusa, rhachi glabra, bracteae glabrae pelta rotunda centro pedicellata, ovario inferne in rhachi immerso, stigmatibus 3 linearibus acutis, bacca superne libera globosa et glabra.

Dioicum. Ramuli spiciferi 1.5 mm crassi in sicco nigri, collenchyma in fasciculos discretos dispositum et haud libriforme. Limbi in sicco rigidi fusci et minute pellucido-punctulati, circiter 7.8 cm longi et usque ad 3 cm lati. Petioli circiter 12 mm pedunculi 6 mm longi. Spica 1.4 cm longa et cum baccis usque ad 5 mm crassa, bracteae pelta fero 0.75 mm diam.

LEYTE, Dagami, *Bur. Sci. 15359 Ramos.*

PIPER POLISANUM C. DC. **sp. nov.**

Ramulis hirtellis, foliis parvis modice petiolatis, limbo ovato-acuminato basi inaequilatera oblique rotundato, apice acute acuminato, supra glabro subtus praesertim ad nervos nervulosque puberulo, 5-nervio, petiolo dense hirtello usque ad medium vaginante; stirpis fem. pedunculo puberulo petiolum superante, spica quam limbus pluries breviore, densiflora, rhachi pilosa, bracteae pelta glabra rotunda centro pedicellata, pedicello piloso, ovario libero ovato glabro, stigmatibus 3 ovatis, bacca ovato-globosa.

Dioicum. Ramuli spiciferi 1 mm crassi, in 3 mm crassis collenchyma in fasiculos discretos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco membranacei creberrime pellucido-punctulati, 5.5 cm longi, 2.7 cm lati. Petioli 4 mm, pedunculi 6 mm longi. Spica matura 1.5 cm longa et fere 0.5 mm crassa, bracteae pelta fere 0.75 mm diam., bacca in sicco fuscescens.

LUZON, Ifugao Subprovince, Mount Polis, *Bur. Sci. 19617, 19816 McGregor.*

PIPER PILIPES C. DC. in Philip. Journ. Sci. **5** (1910) Bot. 423.

LEYTE, Dagami, *Bur. Sci. 15364 Ramos, Wenzel 20, 717, 773, 889, 894, 948.*

PIPER RHYNCHOLEPSIS C. DC. in DC. Prodr. **16**[1] (1869) 344.

SAMAR, *Bur. Sci. 17409, 17563, 17595 Ramos.* LEYTE, *Wenzel 56, 733.*

PIPER ROTUNDISTIGMUM C. DC. in Philip. Journ. Sci. **5** (1910) Bot. 425.

Adde: Stirpis masc. spica florens limbi dimidium superans, rhachis hirsuta, bracteae glabrae pelta rotunda centro pedicellata. Stamina 2, antherae ellipticae 4-valvatae quam filamenta oblonga multo breviores.

LEYTE, Dagami, *Bur. Sci. 15247, 15379 Ramos;* Palo, *Elmer 7079,* scandent, not much branched, staminate inflorescence about a foot long, curved, infructescense somewhat shorter, rigid, yellowish-red, irregularly curved.

β **PILOSIUS** C. DC. **var. nov.**

Ramulis villosis, limbo supra puberulo subtus hirtello; stirpis masc. spica subflorente quam limbo paullo breviore, rhachi hirsuta, bracteae glabrae pelta rotunda pedicello longiusculo, staminibus 2, antheris ellipticis 4-valvatis filamenta paullo angustiora fere aequantibus.

SAMAR, *Bur. Sci. 17434, 17653 Ramos.*

PIPER AURILIMBUM C. DC. in Elm. Leafl. Philip. Bot. 3 (1910) 768.

Adde: Stirpis masc. scandentis, pedunculo 14 mm longo, spica florente 2.5 cm longa et 3 mm crassa, rhachi et bractea ut in femina, staminibus 2, antheris rotundato-ovatis primum 4-locularibus, adultis magnis paullo ultra 1 mm longis et 2-valvatis.

LUZON, Ifugao Subprovince, Mount Polis, *Bur. Sci. 19821 McGregor*: Cagayan Province, Abulug River, *Weber 1584*.

PIPER CRASSILIMBUM C. DC. sp. nov.

Ramulis glabris; foliis breviter petiolatis glabris, limbo late ovato basi cordulato apice acute acuminato, 7-plinervio, nervo centrali nervos adscendentes 2 mittente quorum supremus a 7–15 mm supra basin solutus, nervis lateralibus utrinque 2 a basi divaricantibus, petiolo basi ima vaginante; stirpis masc. pedunculo glabro petiolum subaequante, spica florente quam limbus pluries breviore, rhachi hirsuta, bracteae pelta rotunda carnosa centro breviter pedicellata, staminibus 2 antheris rotundatis filamenta fere aequantibus; stirpis fem. pedunculo ut in mare, spica florente quam limbus pluries breviore, rhachi parce pilosa, bracteae pelta rotunda carnosa centro breviter pedicellata, ovario basi in rhachi leviter immerso superne oblongo carnoso glabro, stigmatibus 3 rotundatis carnosis.

Dioicum, scandens, 2–3 m altum. Ramuli in sicco flavicantes, spiciferi 2 mm crassi, in 3.5 mm crassis collenchyma in fasciculos discretos a latera productos sat crassos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, in mare canalis lysigenus unicus centralis, in femina canalis centralis periphericique multi, cellulae aurantiacae in cortice et in medulla crebrae. Limbi in sicco coriacei flavescentes et haud pellucido-punctulati, usque ad 12.5 cm longi et 8.7 cm lati. Petioli circiter 10 mm. Spica masc. 3.5 cm longa et inferne usque ad 3 mm crassa; spica fem. fere 2 cm longa et usque ad 3 mm crassa bracteae pelta 1.5 mm diam.

LUZON, Benguet Subprovince, Baguio, *Merrill 7649, 7660*, in thickets, limestone region, altitude about 1,550 m, flowers greenish-yellow.

PIPER PALAWANUM C. DC. sp. nov.

Ramulis glabris; foliis breviter petiolatis glabris parvis, limbo ovato basi aequilatera cordulato summo apice acuto, 7-plinervio, nervo centrali nervos 2 adscendentes mittente quorum supremus circiter a 7 mm supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis, petiolo basi ima vaginante; stirpis masc. pedunculo glabro quam petiolus multo longiore, spica limbum superante glabra, bracteae pelta rotunda centro

sat longe pedicellata, staminibus 2 antheris ovatis 4-valvatis filamenta superantibus.

Dioicum, scandens. Ramuli 1.5 mm crassi tenues et costulati, collenchyma continuum et in costulis auctum, haud libriforme, fasciculi intramedullares 1-seriati, canalis lysignus unicus centralis. Limbi in sicco membranacei, minute pellucido-punctulati, usque ad 5.5 cm longi et 2.9 cm lati. Petioli 2 mm longi.

PALAWAN, Babuyan, *Bur. Sci. 15573 Fénix*, near the seashore, flowers greenish-yellow.

PIPER RAMOSII C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 426.

Adde: Stirpis fem. spica matura 1.5 cm longa, bractea ut in mare, ovarium liberum glabrum, stigmata 3 linearia, acuta, bacca ovata in vivo et in sicco rebescens, 2 mm longa.

LUZON, Rizal Province, *Bur. Sci. 19149 Reillo, Bur. Sci. 13397, 13433, 22279 Ramos.* MINDANAO, Bukidnon Subprovince, *Bur. Sci. 15788 Fénix.*

PIPER DAGAMIENSE C. DC. sp. nov.

Ramulis hirsutis; foliis sat longe petiolatis, limbo oblongo-ovato basi inaequilatera cordato apice obtusiuscule acuminato supra glabro, subtus praesertim ad nervos nervulosque hirtello, 11–13-plinervio, nervo centrali nervos adscendentes utrinque 2 mittente quorum supremus a 3.5–4.5 cm supra basin centralis solutus, nervis lateralibus utrinque 3–4 a basi divaricantibus quorum externi aliis multo tenuiores et breviores, petiolo hirsuto ultra medium vaginante; stirpis fem. pedunculo hirtello quam petiolus multo breviore, spica quam limbus pluries breviore, bracteae pelta glabra rotunda margine denticulata, pedicello brevi hirsuto, bacca inferne rhachi immersa superne libera glabra et in stilum sat longum attenuata, stigmatibus 2 oblongis apice obtusis et longitudinaliter dispositis, vel interdum 3.

Dioicum. Ramuli spiciferi circiter 4 mm crassi, collenchyma continuum haud libriforme, fasciculi intramedullares 1-seriati, canales lysigeni peripherici nulli, cellulae aurantiacae in cortice et in medulla crebrae. Limbi in sicco membranacei minute pellucido-punctulati, 18 cm longi et 8.5 cm lati. Petioli usque ad limbi latus longius 2 cm inter limbi latera 3 mm, pedunculi 1 cm longi. Spica submatura 2.5 cm longa et cum stilis usque ad 1.2 cm crassa, bracteae pelta 2 mm diam.

LEYTE, Dagami, *Bur. Sci. 15181 Ramos.*

PIPER MYRMECOPHILUM C. DC. sp. nov.

Ramulis spiciferis longe villosis; foliis brevissime petiolatis, limbo ovato basi cordato et plerumque altero latere a petiolo plus minusve latiore ac magis arcuato, apice longe et acute

acuminato, supra, praesertim inferne, ad nervum centralem piloso et haud bullato subtus glabro, 12-plinervio nervis subtus prominentibus, nervo centrali nervos 2 adcendentes alternatim mittente quorum supremus a 4 cm supra basin solutus nervisque lateralibus altero latere 4 altero 7 a basi solutis, petiolo hirsuto basi ima vaginante; pedunculo hirsuto petiolum superante, spica limbo pluries breviore obovato-cylindrica stilis dense hirta, rhachi hirsuta, bracteae pelta orbiculari parva et glabra pedicello longe villoso, bacca libera glabra oblongo-obovata superne in stilum tenuem ea pluries longiorem producta, stilo apice in stigmata 2 longitudinalia breviter bifido.

Dioicum. Ramuli spiciferi 2.5 mm crassi, pili usque ad 3 mm longi in sicco fuscescentes, collenchyma continuum et haud liriforme, zona cellularum sclerosarum subepidermidali cinctum, fasciculi intramedullares 2-seriati, canalis lysigenus centralis peripheriquique 2. Limbi in sicco firmi creberrime et minute pellucido punctati, usque ad 19 cm longi et 8 cm lati basi altero latere in saccum rotundatum et formicosum deorsum reflexi. Petioli circiter 5 mm, pedunculi 1 cm longi. Spicae fere maturae 5 cm longae cum stilis 2 cm crassae rhachis fere 3.3 mm crassa canali lysigeno centrali peripherisque pluribus munita, bracteae pelta 0.5 mm diam. pedicellus 4 mm longus; bacca fere matura 1.5 mm longa et ejus stilus 7 mm longus.

SAMAR, *Bur. Sci. 17599 Ramos.*

PIPER MERRILLII C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 426.

SAMAR, *Bur. Sci. 17527 Ramos.* NEGROS, Canlaon Volcano, *Merrill 7033*, in forests, altitude about 600 m, fruit green.

PIPER PSEUDOCHAVICA C. DC. forma b C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 428.

LUZON, Bontoc Subprovince, *Vanoverbergh 691.*

PIPER MAGALLANESANUM C. DC. sp. nov.

Ramulis glabris; foliis breviter petiolatis glabris, limbo oblongo-ovato basi ima aequilatera subacuto obtusove apice acute attenuato, 7-plinervio, nervo centrali nervos 2 adscendentes et alternos mittente quorum supremus fere a 1 cm supra basin solutus, nervis lateralibus utrinque 2 adscendentibus a basi solutis quorum externi aliis multo breviores, petiolo usque ad limbum vaginante; stirpis fem. pedunculo glabro petiolum paullulo superante, spica submatura quam limbus pluries breviore apice obtusa, rhachi hirsuta, bracteae pelta glabra rotunda centro pedicellata pedicello dense hirsuto, ovario libero ovato glabro, stigmatibus 3 oblongis brevibus.

Dioicum. Ramuli in sicco fusci, spiciferi 1.5 mm crassi, collenchyma continuum et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco rigidi, minute pellucido-punctulati, usque ad 10.7 cm longi et 3.8 cm lati. Petioli 5 mm, pedunculi 7 mm longi. Spica fem. submatura, in sicco fusca, 2.5 cm longa et 4 mm crassa, bracteae pelta 1 mm diam.

SIBUYAN, Mount Giting-giting, *Elmer 12313 p. p.*

PIPER WENZELII sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo elliptico-lanceolato basi aequilatera acuto apice acute acuminato, 7-plinervio nervo centrali nervos adscendentes utrinque 2 mittente quorum supremus a 2–3 cm supra basin infimus paullulo supra basin centralis solutus, nervo laterali adscendente utrinque a basi soluto, petiolo basi ima vaginante, stirpis fem. pedunculo petiolum fere aequante et glabro, spica matura limbi dimidium paullo superante, bracteae pelta rotunda glabra pedicello sat longo et dense hirsuto, bacca libera obovata, stigmatibus ovatis brevibus.

Dioicum. Ramuli in sicco flavescentes, spiciferi 3 mm crassi, collenchyma continuum et libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus centralis pluresque peripherici. Limbi in sicco coriacei pallescentes, usque ad 15.5 cm longi et 5.4 cm lati. Petioli fere 2 cm longi. Spica matura usque ad 9.5 cm longa et fere 4 mm crassa, bracteae pelta 1 mm diam., bacca 1.5 mm longa ut bractea in sicco rubra.

LEYTE, *Wenzel 628.*

PIPER ALBIDIRAMEUM C. DC. in Perk. Frag. Fl. Philip. (1905) 153.

LEYTE, *Wenzel 1151,* in forests, altitude about 700 m, a vine about 6 m high and 2 cm in diameter, fruit red.

Forma c C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 429.

LUZON, Laguna Province, *Bur. Sci. 16597, 16630 Ramos;* Mount Banajao, *Elmer "B,"* a tall climber, fruit brick-red, branches few and quite rigid: Tayabas Province, Lucban, *Elmer 8117a.* BILIRAN, *Bur. Sci. 18706 McGregor,* in forests, altitude 500 m, fruit red. LEYTE, *Wenzel 1006.*

PIPER HIRTIRHACHE C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo subovato-elliptico-lanceolato basi aequilatera acuto apice acute et sat longe acuminato, 7-plinervio nervo centrali nervos adscendentes utrinque 2 mittente, quorum supremus ex 2.5 cm supra basin solutus nervo laterali adscendente utrinque a basi soluto, petiolo basi ima vaginante, stirpis masc. pedunculo glabro petiolum fere

aequante, staminibus 2, antheris 4-valvatis filamenta brevia aequantibus, stirpis fem. pedunculo glabro petiolum paullo vel usque ad duplo superante, spica florente limbi dimidium superante, rhachi dense hirsuta, bracteae pelta rotunda glabra centro breviter pedicellata pedicello hirsuto, ovario libero ovato, stigmatibus ovato-acutis.

Dioicum. Ramuli spiciferi fere 3 mm crassi, collenchyma continuum libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco firme membranacei pallidi epunctati, in mare usque ad 17.5 cm longi et 4.5 cm lati, in femina usque ad 17 cm longi et 5.5 cm lati. Petioli 11 mm, pedunculi 22 mm longi. Spica florens 10 cm superans et fere 2 mm crassa, rhachis in mare et in femina canali lysigeno centrali peripheric isque multis munita, bracteae pelta fere 1 mm diam. in sicco pallide fuscescens.

LEYTE, *Wenzel 1168, 819, 1197* spec. femin., *779* spec. masc., *891* spec. masc. cum staminibus in staminoidia mutatis.

PIPER VILLIRHACHE C. DC. sp. nov.

Ramulis glabris crassis; foliis modice petiolatis glabris, limbo amplo subobovato-elliptico basi leviter inaequilatera utrinque acuto summo apice apiculato, 13- ad 17-plinervio nervo centrali nervos adscendentes utrinque 4–6 mittente quorum supremus alte supra medium centralis solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis, petiolo basi ima vaginante; stirpis fem. pedunculo glabro quam petiolus breviore, spica quam limbus pluries breviore, rhachi dense villosa, bracteae pelta glabra obovata centro longe pedicellata pedicello villoso, floribus dense condensis, ovario libero glabro ovato apice attenuato, stigmatibus 3–4 oblongis, bacca ovato-globosa glabra.

Dioicum scandens. Ramuli in sicco fuscescentes, spiciferi fere 7 mm crassi, collenchyma continuum haud libriforme, fasciculi intramedullares 1-seriati, cellulae fuscescentes in cortice et in medulla creberrimae. Limbi in sicco firme membranacei creberrime et praesertim secus nervulos pellicido-punctulati, punctulis rubris, superi 25.5 cm longi et 14 cm lati. Petioli usque ad limbi latus longius 3 cm, inter limbi latera 4 mm pedunculi 2 cm longi. Spica matura 6.5 cm longa et 6 mm crassa, rhachis canali lysigeno unico centrali munita, bracteae pelta 1.5 mm longa, bacca 2 mm longa et 1.75 mm lata, in vivo rubra, in sicco fulvescens.

MINDANAO, Bukidnon Subprovince, Sumilao, *Bur. Sci. 15773 Fénix,* a vine on trees, locally known as *tugpuan.*

PIPER PSILOCARPUM C. DC. **sp. nov.**

Ramulis glabris; foliis sat longe petiolatis glabris, limbo elliptico basi aequilatera acuto apice acute acuminato, 9-ninervio nervo centrali nervum adscendentem utrinque fere a 3 cm supra basin mittente, nervis lateralibus adscendentibus utrinque 3 a basi solutis, petiolo basi ima vaginante; stirpis fem. pedunculo glabro quam petiolus breviore, spica florente quam limbus pluries breviore glabra apice obtusa, bracteae pelta rotunda centro breviter pedicellata, ovario inferne in rhachi immerso superne libero et conoideo, stigmatibus 4 ovatis apice acutiusculis.

Dioicum, ut videtur erectum. Ramuli in sicco fuscescentes, spiciferi 2 mm crassi, collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus centralis pluresque peripherici. Limbi in sicco subrigide membranacei minutissime pellucido-punctulati usque ad 20 cm longi et 2.8 cm lati. Petioli 3 cm, pedunculi 1.5 cm longi. Spica florens 2.8 cm longa et cum ovariis 5 mm crassa, rhachis canali lysigeno unico centrali munita, bracteae pelta 1 mm diam.

LEYTE, Jaro, *Wenzel 896,* in forests, altitude 500 m.

PIPER MACGREGORII sp. nov.

Ramulis glabris; foliis longiuscule petiolatis glabris, limbo oblongo-ovato basi leviter inaequilatera utrinque obtuso apice obtusiuscule acuminato, 7-plinervio nervo centrali nervos adscendentes utrinque 2 mittente quorum supremus fere a 4 cm supra basin infimusque fere a basi soluti et nervo laterali utrinque a basi soluto aliis magis arcuato ac multo tenuiore brevioreque, petioli basi ima vaginante; pedunculo glabro petiolum superante et tenui, spica florente quam limbus pluries breviore cylindrica et apice mucronulata, rhachi puberula, bracteae glabrae pelta rotunda late sessili, ovario inferne in rhachi profunde immerso superne emerso glabro, stigmatibus brevibus ovato-acutis.

Dioicum. Ramuli spiciferi 2 mm crassi in sicco fuscescentes, in 3 mm crassis collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus centralis peripherici que plures. Limbi in sicco membranacei minutissime pellucido-punctulati, usque ad 17.5 cm longi et 7.3 cm lati. Petioli usque ad limbi latus longius 2 cm inter limbi latera 2 mm longi. Pedunculi 3.7 cm longi. Spicae 1.9 cm longae et circiter 4 mm crassae, rhachis canali lysigeno centrali peripherisque pluribus munita, bracteae 1 mm diam.

BILIRAN, *Bur. Sci. 18491 McGregor,* altitude 300 m.

PIPER BETLE Linn. Sp. Pl. (1753) 28.

LUZON, Camarines Province, *Bur. Sci. 22134 Ramos:* Laguna Province, *Bur. Sci. 15053, 16639 Ramos.*

Forma b C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 431.

LUZON, Laguna Province, Los Baños, *Bur. Sci. 9689 Robinson*, in forests, altitude about 30 m: Tayabas Province, Tagcauayan, *Bur. Sci. 13386 Ramos:* Bulacan Province, Norzagaray, *Bur. Sci. 13031 Ramos:* Rizal Province, *Bur. Sci. 13534 Ramos*, flowers yellow.

Forma c C. DC. l. c.

LUZON, Nueva Vizcaya Province, near Dupax, *Bur. Sci. 14172, 14179 Ramos:* Bataan Province, *For. Bur. 23212 Alambra & Caulas.* PANAY, Iloilo Province, *Bur. Sci. 18153 Robinson.*

PIPER SARCOSTYLUM C. DC. sp. nov.

Ramulis glabris; foliis breviter petiolatis glabris, limbo elliptico-lanceolato basi aequilatera acuto apice acute acuminato; 7-plinervio nervo centrali nervos adscendentes utrinque 2 opposite mittente quorum supremi a 2.5 cm supra basin soluti, nervo laterali adscendente utrinque, a basi soluto, petiolo basi ima vaginante; stirpis fem. pedunculo glabro petiolum paullulo superante, spica florente quam limbus pluries breviore, rhachi hirsuta, bracteae glabrae pelta rotunda centro subsessili, ovario inferne in rhachi immerso superne in stilum carnosum oblongum glabrum producto, stigmatibus 3 ovatis brevibus.

Dioicum, in arboribus scandens. Ramuli in sicco fusci, spiciferi 1 mm crassi, collenchyma fere omnino libriforme in fasciculos discretos a latere productos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis, zona cellularum sclerosarum cum phloemate fasciculorum periphericorum continua, cellulaeque sclerosae in cortice glomerulatim dispositae. Limbi in sicco rigidi creberrime pellucido-punctulati, usque ad 10.5 cm longi et 4.2 cm lati. Petioli 5 mm, pedunculi 8 mm longi. Spica florens 2 cm longa et usque ad 8 mm crassa, bracteae pelta 0.5 mm diam., stilus paullo ultra 0.5 mm longus. Species *P. chabae* Bl. proxima.

MINDANAO, Butuan Subprovince, Agusan River, *Merrill 7305.*

PIPER CHABA Blume Verh. Bat. Genoots. 11 (1826) 168.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 16608, 20520, 20582 Ramos;* Mount Maquiling, *Bur. Sci. 17003 Robinson:* Camarines Province, Mount Isarog, *Bur. Sci. 22077 Ramos.* LEYTE, Dagami, *Wenzel 40, 802, Bur. Sci. 15503 Ramos.*

PIPER RHOMBOPHYLLUM C. DC. Prodr. 16[1] (1869) 352.

LUZON, Tayabas Province, *Bur. Sci. 13282 Ramos:* Camarines Province, *Bur. Sci. 22150 Ramos.* SAMAR, *Bur. Sci. 17507 Ramos.* LEYTE, *Elmer 7080.*

PIPER FUSCESCENTIRAMEUM C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo elliptico-lanceolato basi aequilatera acuto apice acute acuminato, 9-ninervio, nervo centrali nervos adscendentes 2 alternatim mittente quorum supremus a 3 cm supra basin solutus, nervis lateralibus utrinque 3 a basi solutis quorum 2 adscendentes tertius subadscendens aliis multo tenuior ac brevior, petiolo basi ima vaginante; pedunculo glabro quam petiolus multo breviore, spica cylindrica florens quam limbus pluries breviore, rhachi hirsuta, bracteae glabrae pelta rotunda centro breviter pedicellata, ovario rhachi immerso superne in stilum liberum sat longum conicum et glabrum producto, stigmatibus ovatis.

Dioicum, scandens. Ramuli in sicco fuscescentes, spiciferi 1 mm crassi, in 4 mm crassis collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus centralis peripheriquique plures. Limbi in sicco firme membranacei pellucido punctulati, superi usque ad 19 cm longi et 7.7 cm lati. Petioli 2.5 cm pedunculi 0.6 cm longi. Spica florens 1 cm longa cum stilis 4 mm crassa, in vivo alba in sicco fuscescens, rhachis canali lysigeno unico centrali munita, bracteae pelta 1 mm diam., stigmata 3.

LEYTE, *Wenzel 1184*, a vine in forests, altitude about 500 m, flowers white.

PIPER VIMINALE Opiz in Presl Rel. Haenk. 1 (1828) 150, *t. 26.*

LUZON, Laguna Province, San Antonio, *Bur. Sci. 20400 Ramos.* CAMIGUIN, *Bur. Sci. 14645, 14685 Ramos.*

PIPER CAGAYANENSE C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 435.

LUZON, Cagayan Province, *Bur. Sci. 13838 Ramos*, on trees in forests.

PIPER PODANDRUM C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 436.

LUZON, Rizal Province, *Loher 6008.*

PIPER CALVIFOLIUM C. DC. sp. nov.

Ramulis glabris; foliis breviter petiolatis glabris, limbo elliptico-subovato-lanceolato basi aequilatera acuto, apice acute et sat longe acuminato, 5-plinervio, nervo centrali nervos 2 adscendentes mittente quorum supremus a 7–15 mm supra basin solutus, nervo laterali utrinque a basi soluto, petiolo usque ad limbum vaginante; stirpis masc. pedunculo glabro petiolum superante, spica florente quam limbus pluries breviore, rhachi hirsuta, bracteae pelta glabra rotunda centro pedicellata pedicello hirsuto, staminibus 2 antheris ovatis quam filamenta longioribus.

Ramuli spiciferi fere 1 mm crassi, collenchyma in fasciculos discretos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis, pholoema inter fas-

ciculos peripherícos continuum. Limbi in sicco membranacei minute et inconspicue pellucido-punctulati, 8.5–9 cm longi 2.5–2.8 cm lati. Petioli fere 4 mm pedunculi 10 mm longi. Spica florens 1.7 cm longa at 1.5 mm crassa, rhachis sine canali lysigeno, bracteae pelta 0.5 mm diam.

LUZON, *Loher 6794 p. p.*, h. Monac. ex h. Kew.

PIPER POLYCLADUM C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 438.

LUZON, Benguet Subprovince, Baguio, *Phil. Pl. 751 Merrill*, in thickets, limestone region, altitude 1,500 m, flowers yellow: Rizal Province, *Bur. Sci. 13396 Ramos*, on trees in forests.

PIPER SARMENTOSUM Roxb. Fl. Ind. 1 (1820) 162.

NEGROS, Cabancalan, *Merrill 6729*. CAMIGUIN, Mambajao, *Elmer 14245*.

Forma b C. DC. forma nova.

Limbo brevius acuminato.

MINDANAO, Davao District, *Piper 449*.

PIPER CORYLISTACHYON C. DC. Prodr. 16 [1] (1869) 346.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 20527, 12030 Ramos:* Rizal Province, Antipolo, *Bur. Sci. 11867 Robinson:* Tayabas Province, *Bur. Sci. 13324 Ramos:* Pangasinan Province, Umingan, *Bur. Sci. 18338 Otanes*. SAMAR, *Bur. Sci. 17420 Ramos*. BILIRAN, *Bur. Sci. 18785 McGregor*. MINDANAO, Davao District, *Bur. Sci. 15859 Fénix*. LEYTE, Malitbog, *Weber 1523*.

Forma b C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 439.

LUZON, Camarines Province, *Philip. Pl. 1575 Ramos*. BILIRAN, *Bur. Sci. 18775 McGregor*. LEYTE, *Elmer 7083*.

Forma d C. DC. l. c.

LUZON, Rizal Province, *Loher 6801:* Cagayan Province, *Bur. Sci. 13882 Ramos*, on trees in damp forests, flowers yellowish-white.

PIPER REINWARDTIANUM C. DC. Prodr. 16[1] (1869) 354.

PANAY, Iloilo Province, *Bur. Sci. 18134 Robinson*.

PIPER RETROFRACTUM Vahl Enum. 1 (1804) 314.

BABUYANES ISLANDS, Dalupiri, *Bur. Sci. 10638, 10651 McGregor:* CAMIGUIN, *Bur. Sci. 4092 Fénix*. LUZON, Rizal Province, *Bur. Sci. 11841 Robinson*, fruit dark-red: Laguna Province, Jala-Jala, *Bur. Sci. 11935 Robinson & Ramos*. MINDORO, *Merrill 3342*, near the seashore. PALAWAN, *Bur. Sci. Weber, Bur. Sci. 190 Bermejos*, Ulugan Bay, *Merrill 7216*, in coconut groves at sea level, *Bur. Sci. 851 Foxworthy*, in forests along streams, growing on trees and shrubs.

PIPER PENNINERVE C. DC. in Perk. Frag. Fl. Philip. (1905) 157.

Adde: Stirpis masc. spica canali lysigneo centrali peripherisque munita, rhachis glabra, bracteae pelta rotunda centro pedicellata, stamina 2, antherae 4-valvatae tetragonae.

LEYTE, Jaro, *Wenzel 719*, in forests, altitude 500 m.

PIPER PERPUNCTATUM C. DC. sp. nov.

Ramulis tantum ad nodos parce puberulis; foliis modice petiolatis, limbo ovato basi aequilatera rotundato apice acute acuminato, supra glabro subtus parce pilosulo, 5-plinervio nervo centrali nervos 2 adscendentes oppositos a 5 mm supra basin mittente, nervo laterali patule adscendente utrinque a basi soluto, petiolo superne parce pilosulo paullo ultra medium vaginante; stirpis masc. pedunculo glabro petiolum aequante tenui, spica florente quam limbus pluries breviore apice attenuata, rhachi hirsuta, bracteae glabrae pelta rotunda margine undulata centro subsessili, staminibus 2, antheris parvis rotundatis 4-valvatis, filamenta oblonga aequantibus.

Dioicum, scandens. Ramuli in sicco nigri, spiciferi 0.5 mm crassi, collenchyma libriforme in fasciculos discretos a latere productos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco tenuiter membranacei creberrime pellucido-puntati, superi 7 cm longi et 4 cm lati, subsequentes rotundato-ovati basi cordati apice acute acuminati 7 cm longi et 5.6 cm lati. Petioli superi 4 mm, subsequentes usque ad 20 mm longi. Spica florens 9 mm longa fere usque ad 1.5 mm crassa, bracteae pelta 0.55 mm diam.

PALAWAN, Malampaya Bay, *Merrill 7246*, on trees in forests, altitude about 8 m, flowers green.

PIPER DELICATUM C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 443.

LUZON, Benguet Subprovince, Mount Tonglon, *Phil. Pl. 750 Merrill*, mossy forest, altitude about 1,900 m, a vine 1 to 3 m high growing on tree trunks, flowers pale yellow: Ifugao Subprovince, Mount Polis, *Bur. Sci. 19815 McGregor:* Bontoc Subprovince, *Vanoverbergh 1140*, in forests, altitude about 1,600 m: Camarines Province, Mount Isarog, *Bur. Sci. 22061 Ramos.*

Forma b C. DC. forma nova.

Foliis minoribus, limbo usque ad 4 cm longo et 1 cm lato.

LUZON, Benguet Subprovince, Pauai, *Mrs. Clemens 9160.*

PIPER LONGIVAGINANS C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 444.

LUZON, Camarines Province, Mount Isarog, *Bur. Sci. 22057 Ramos.*

Forma b C. DC. forma nova.

Foliis minoribus, limbo usque ad cm longo et 1 cm lato.

LUZON, Province of Rizal, *Loher 6789, 6811.* SIBUYAN, *Elmer 12313 p. p.*

PIPER EUPODUM C. DC. sp. nov.

Ramulis junioribus haud dense hirsutis; foliis modice petiolatis, limbo ovato-acuminato basi fere aequilatera in mare rotundato in femina acuto, apice acute acuminato, supra tantum inferne et subtus ubique ad nervos nervulosque haud dense hirtello,

7-plinervio nervo centrali paullo supra basin trifido nervis lateralibus utrinque 2 a basi solutis, petiolo sat dense hirsuto basi vaginante; pedunculo parce hirtello petiolum triplo superante; spica subflorente quam limbus longiore, in mare rhachi dense hirsuta, bracteae pelta glabra rotundato-obovata pedicello sat longo basi parce piloso, staminibus, 2 antheris ellipticis 4-valvatis quam filamenta aequilata multo brevioribus, in femina rhachi hirsuta foveataque, bracteae pelta glabra transverse elliptica centro pedicellata pedicello hirsuto, baccis condensis obovato-oblongis glabris, stigmatibus 3 oblongis brevibus et hirtellis.

Frutex scandens. Ramuli spiciferi 1 mm crassi, collenchyma in fasciculos discretos dispositum, libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco membranacei minute pellucido-punctulati, superi 6.5 cm longi et 3.5 cm lati. Petioli fere 1 cm, pedunculi 3.5 cm longi. Spica subflorens 8.5 cm longa et usque ad 2.5 mm crassa, bracteae pelta 0.75 mm longa.

LEYTE, Dagami, *Bur. Sci. 15227 Ramos*, masc., in forests, altitude 500 m, *Wenzel 1005*, fem., a vine, fruit green.

PIPER LEYTEANUM C. DC. sp. nov.

Ramulis velutine puberulis; foliis sat longe petiolatis, limbo oblongo-ovato basi fere aequilatera cordato apice acute acuminato, utrinque velutine puberulo; nervo centrali nervos adscendentes utrinque 4 mittente, quorum supremus a 5–7 cm supra basin centralis solutus, nervis lateralibus utrinque 3–4 a basi divaricantibus, petiolo hirtello et velutine puberulo paullo ultra basin vaginante; stirpis masc. pedunculo fere glabro petiolum superante, spica suflorente quam limbi dimidium paullo longiore, rhachi hirsuta, bracteae glabrae pelta rotunda centro sat longe pedicellata, staminibus 2, antheris 4-valvatis.

Ramuli spiciferi 2.5 mm crassi, collenchyma in fasciculos discretos dispositum et zona interna vel fere omnino libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus centralis nullus, peripherici plures. Limbi in sicco membranacei inconspicue pellucido-punctulati, 15–20.5 cm longi, 8.5–9 cm lati. Petioli 2 cm, pedunculi 3.5 cm longi. Spica subflorens 2 mm crassa, bracteae pelta fere 0.75 mm diam.

LEYTE, Dagami, *Wenzel 214*.

PIPER OVATIBACCUM C. DC. in Elm. Leafl. Philip. Bot. 3 (1910) 782.

LUZON, Laguna Province, Mount Banajao, *Bur. Sci. 9755, 9759 Robinson;* San Antonio, *Bur. Sci. 20418, 20428, 20486 Ramos:* Tayabas Province, Mount Pular, *Bur. Sci. 19370 Ramos*. LEYTE, *Wenzel 735, 1114, 1162, Bur. Sci. 15363 Ramos*, in forests, altitude 500 m, fruit scarlet.

PIPER CHLOROCARPUM C. DC. **sp. nov.**

Ramulis villosis; foliis modice petiolatis, limbo ovato-lanceolato basi ima leviter inaequilatera anguste cordulato apice acute et sat longe acuminato supra et subtus densius piloso, nervo centrali nervos adscendentes utrinque 4 mittente quorum supremus a 2 cm supra basin solutus, petiolo villoso usque ad medium vaginante; stirpis fem. pedunculo tenui parce piloso petiolum multo superante, spica limbi dimidium subaequante apice rotundata, densiflora, rhachi pilosa, bracteae pelta rotunda glabra centro sat longe pedicellata pedicello piloso, bacca libera oblonga obovata glabra, stigmatibus 3 ovatis brevibus.

Dioicum. Ramuli 2 mm crassi, collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis. Limbi in sicco firmi, pellucido-punctulati 15.5 cm longi et usque ad 5.2 cm lati. Petioli usque ad limbi latus longius 7 mm, inter limbi latera 2 mm longi. Pedunculi 4.5 cm longi. Spica in vivo viridis, matura 7.5 cm longa et 0.6 cm crassa, bracteae pelta fere 0.75 mm diam.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 16638 Ramos.*

PIPER AGUSANENSE C. DC. in Elm. Leafl. Philip. Bot. 6 (1914) 2291.

CAMIGUIN, *Bur. Sci. 14644 Ramos.*

PIPER TOPPINGII C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 446.

LUZON, Benguet Subprovince, Mount Tonglon, *Merrill 7770*, vine 2 to 3 m long, on trees, altitude about 2,000 m; Baguio, *Bur. Sci. 14114 Robinson:* Ifugao Subprovince, Mount Polis, *Bur. Sci. 19818 McGregor:* Rizal Province, San Isidro, *Phil. Pl. 274 Ramos.*

PIPER OVATIBRACTEUM C. DC. in Elm. Leafl. Philip. Bot. 3 (1910) 784.

LUZON, Tayabas Province, *Bur. Sci. 13368 Ramos.* MINDANAO, Butuan Subprovince, Agusan River at Talacogon, *Merrill 7316*, on trunks of palms and other trees, flowers yellowish. CAMIGUIN, *Bur. Sci. 14646, 14771 Ramos.*

PIPER LONGILIMBUM C. DC. **sp. nov.**

Ramulis tantum ad nodos hirtellis; foliis breviter petiolatis, limbo elliptico-lanceolato basi leviter inaequilatera acuto apice longe et acute acuminato, supra glabro subtus hirsuto, nervo centrali nervos subrectos adscendentes utrinque 11–12 mittente quorum supremus a 16 cm supra basin solutus, petiolo hirsuto basi vaginante; pedunculo parce piloso quam petiolus breviore, spica subflorente quam limbi dimidium paullo breviore, rhachi pilosa, bracteae glabrae pelta rotunda centro pedicellata, staminibus 2 antheris obovatis filamenta tenuis superantibus connectivo ultra thecas peltatim et tenuiter producto.

Dioicum. Ramuli in sicco complanati fere 5 mm crassi, col-

lenchyma in fasciculos discretos a latere valde productos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus unicus centralis, cellulae fuscescentes in cortice et in medulla crebrae. Limbi in sicco membranacei epunctati, usque ad 27 cm longi et 9 cm lati. Petioli usque ad limbi latus longius 10 mm, inter limbi latera 3 mm longi. Pedunculi 8 mm longi. Spicae 10.5 cm longae et circiter 2 mm crassae canali lysigeno unico centrali munitae, bracteae pelta fere 0.5 mm diam.

SAMAR, *Bur. Sci. 17602 Ramos.*

PIPER INTERRUPTUM Opiz in Presl Rel. Haenk. 1 (1828) 157.

LUZON, Rizal Province, San Isidro, *Phil. Pl. 267 Ramos:* Cagayan Province, Abulug River to Linao, *For. Bur. 11611 Curran:* Nueva Vizcaya Province, *Bur. Sci. 20144 McGregor.*

Forma b C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 448.

LUZON, Laguna Province, Calauan, *Bur. Sci. 12425 McGregor.*

Forma c C. DC. forma nova.

Limbo minore et angustiore, nempe usque ad 9 cm longo et 3 cm lato antheris quam filamenta adulta oblonga multo brevioribus.

LUZON, Bontoc Subprovince, Bauco, *Vanoverbergh 1184, 558,* in forests, altitude 1,250 to 1,690 m.

PIPER SUBARBORESCENS C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 449.

LUZON, Rizal Province, *For. Bur. 3299 Ahern's collector, Bur. Sci. 22278 Ramos.*

PIPER PULOGENSE C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 453.

Species propter baccam vix stipitatam hic collocanda.

LUZON, Benguet Subprovince, Mount Tonglon, *Phil. Pl. 749 Merrill,* vine 2 to 3 m high on trees, altitude 2,200 m, flowers green.

PIPER MULTISTIGMUM C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo ovato-acuminato basi ima aequilatera acuto apice acute acuminato, 5-nervio, petiolo ultra medium vaginante; stirpis fem. pedunculo glabro petiolum paullo superante, spica quam limbus fere duplo longiore, rhachi pilosa, bracteae glabrae pelta obovato-oblonga apice rotundata deorsum attenuata et tantum marginibus libera, ovario glabro libero, stigmatibus 5–6 linearibus apice acutis, bacca matura ovato-globosa.

Dioicum. Ramuli spiciferi fere 1.5 mm crassi in sicco nigrescentes, collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus unicus

centralis. Limbi in sicco membranacei pellucido-punctulati, 8.8 cm longi, 3.5 cm lati. Petioli 1 cm, pedunculi usque ad 1.6 cm longi. Spica baccifera usque ad 15.5 cm longa, rhachis canali lysigeno unico centrali munita, bractea fere 5.5 longa et apice 1 mm lata, bacca in sicco fuscescens, fere 4 mm longa.

LUZON, Ifugao Subprovince, Mount Polis, *Bur. Sci. 19819 McGregor.*

PIPER LOHERI C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 450.

LUZON, Laguna Province, Calauan, *Bur. Sci. 12421 McGregor:* Rizal Province, Montalban, *Phil. Pl. 269 Merrill, Bur. Sci. 11840 Robinson.*

Forma c C. DC. forma nova.

Limbo 5-nervio, rotundato-ovato-lanceolato basi aequilatera acuto apice acute acuminato, usque ad 7 cm longo et 4–8 cm lato.

LUZON, Union Province, Bauang, *Bur. Sci. 12983 Fénix.*

Forma b multiplinerve C. DC. l. c.

LUZON, Bulacan Province, Norzagaray, *Bur. Sci. 12242 Foxworthy,* fruit orange.

PIPER SAMARANUM C. DC. sp. nov.

Ramulis glabris, foliis modice petiolatis glabris, limbo ovato-lanceolato basi leviter inaequilatera utrinque acuto apice acute acuminato, 5-plinervio nervo centrali nervos adscendentes 2 alterne vel opposite mittente quorum supremus a 1 cm supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis quorum externus aliis multo tenuior et brevior, petiolo tenui basi vaginante; pedunculo glabro petiolum multo superante, spica quam limbus fere duplo longiore, glabra, bractea subobovato-oblonga inferne attenuata apice rotundata, baccis condensis subglobosis, stigmatibus ovato-acutis.

Dioicum. Ramuli in sicco cinerescentes, spiciferi 1.75 mm crassi, collenchyma fere omnino libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenus nullus. Limbi in sicco cinerescentes firmi inconspicue et minute pellucido-punctulati, circiter 7.7 cm longi et 2.7 cm lati. Petioli usque ad 0.7 cm, pedunculi 2 cm longi. Spica 13.5 cm longa, bractea apice paullo ultra 1 mm lata, bacca 3.5 mm longa, in sicco fuscescens.

SAMAR, *Bur. Sci. 17546 Ramos.*

PIPER NIGRUM Linn. forma **GLABRISPICA** C. DC. forma nova.

Stirpis masc. rhachi glabra.

MINDANAO, Butuan Subprovince, Lake Liluan, *Weber.*

PIPER ARBORISEDENS C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo subovato-lanceolato basi aequilatera acuto apice acute et sat longe

acuminato, 5- ad 7-plinervio, nervo centrali nervos 2 adscendentes alternos mittente quorum supremus a 10 mm supra basin solutus, nervo laterali unico vel nervis lateralibus 2 adscendentibus utrinque a basi solutis, quorum externus aliis multo tenuior et brevior, petiolo fere usque ad medium vaginante; stirpis fem. pedunculo glabro petiolum fere aequante, spica matura limbi dimidium fere aequante, rhachi hirsuta, bracteae glabrae pelta obovata centro sessili, ovario libero ovato glandulis subasperato, stigmatibus 3 ovato-acutis, bacca oblongo-ovata glabra stipitem suum glabrum multo superante.

Dioicum, in arboribus scandens. Ramuli in sicco fusci, spiciferi 5 mm crassi, collenchyma in fasciculos discretos a latere productos dispositum et zona interna libriforme, canalis lysigenus unicus centralis. Limbi in sicco rigide membranacei pellucido-punctulati, usque ad 11 cm longi et 3.5 cm lati. Petioli circiter 12 mm longi. Spica fem. matura 5 cm longa, subdensibacca, bracteae pelta 1.5 mm longa et usque ad 1 mm lata, bacca 6 mm longa usque ad 3.5 mm lata, in sicco nigra.

LUZON, Laguna Province, San Antonio, *Bur. Sci. 24934 Ramos.*

PIPER MARIVELESANUM C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 457.

LUZON, Rizal Province, Montalban, *Loher 6792:* Laguna Province, San Antonio, *Bur. Sci. 10952 Ramos*, fruit red: Tayabas Province, Tagcauayan, *Bur. Sci. 13349 Ramos.*

PIPER CANINUM Blume in Verh. Bat. Genoots. 11 (1826) 214.

LUZON, Ifugao Subprovince, Mount Polis, *Bur. Sci. 19820 McGregor:* Camarines Province, Sagnay, *Bur. Sci. 22133 Ramos.* SAMAR, *Bur. Sci. 17508 Ramos.* LEYTE, *Wenzel 856.* MINDANAO, Surigao Province, *Piper 244, 245.* CAMIGUIN, *Bur. Sci. 14645, 14672, 14685, 14699 Ramos.* PALAWAN, Malampaya Bay, *Merrill 7213*, on small trees in forests, flowers green.

PIPER MERRITTII C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 460.

LUZON, Camarines Province, Mount Isarog, *Bur. Sci. 22623 Ramos:* Laguna Province, San Antonio, *Bur. Sci. 16537 Ramos.* SAMAR, *Bur. Sci. 17557 Ramos.*

β parvifolium C. DC. var. nov.

Limbo rotundato basi cordato apice acute acuminato, 7 cm longo, 4.7 cm lato.

LEYTE, *Wenzel 1095*, a vine in forests, altitude 500 m.

PIPER VILLILIMBUM C. DC. in Philip. Journ. Sci. 5 (1910) Bot. 461.

LUZON, Cagayan Province, *Bur. Sci. 13895 Ramos:* Tayabas Province, Mount Banajao, *Elmer "C."* CAMIGUIN, *Bur. Sci. 14472 Ramos.*

Sectio **Heckeria** Hook. f. Fl. Brit. Ind. **5** (1886) 95

PIPER UMBELLATUM Linn. Sp. Pl. (1753) 43, var. **SUBPELTATUM** C. DC. in Donn.-Sm. Enum. **6**: 39.

LUZON, Laguna Province, Mount Maquiling, *Bur. Sci. 16897 Serviñas;* Pililla-Mavitak trail, *Bur. Sci. 11946 Robinson & Ramos;* Benguet Subprovince, Sablan, *Bur. Sci. 12694 Fenix.* BASILAN, *Bur. Sci. 15456 Reillo.* CAMIGUIN, *Bur. Sci. 14723 Ramos.* MINDANAO, Bukidnon Subprovince, *Bur. Sci. 15787 Fenix.*

Var. **GLABRUM**, forma b, C. DC. in Bull. Herb. Boiss. **6** (1898) 494.

LUZON, Laguna Province, Calauan, *Bur. Sci. 12414 McGregor.*

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GROWTH PHENOMENA OF DIOSCOREA

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Studies of *Dioscorea* of several kinds have been in progress at the College of Agriculture during the past three years. These studies, before this year, have included the systematic determinations (by Mr. I. H. Burkill), the preparation of keys for the identification of varieties, the investigation of behavior in the field of a large number of forms, studies of their chemical and culinary characteristics, and growth studies. Considerable information as to the growth of different varieties, with notes as to growth movements, was collected by Mr. Mariano Raymundo in the preparation of a thesis, publication of which is delayed until Mr. Raymundo's return from America.

As a feature of the irregular postal service during these years of war, reviews of the Pfeffer Festschrift [1] reached Manila in advance of the Festschrift itself. From one of these reviews I learned of Professor Newcombe's work, "Das Verhalten der Windepflanzen in der Dunkelheit," [2] and was immediately struck by the natural advantages with which *Dioscorea* would lend itself to such study. It presently developed that Duchartre [3] had long since used *Dioscorea batatas* for this purpose and that De Vries [4] repeated Duchartre's experiments, both agreeing that there was neither circumnutation nor twisting except under the immediate or deferred influence of light.

As neither of these papers, nor any other available literature in the same field, showed any reason for a relation between nutation and illumination, and as a supply of roots of various varieties of *Dioscorea* was on hand at the moment, I had a series of these roots placed where they might germinate. For this initial work,

[1] Jahrbüch. f. Wissenschaf. Bot. 56: (1915).
[2] Ibid., p. 511.
[3] Expériences relatives á l'influence de la lumiére sur l'enroulement des tiges. *Comp. Rend. Acad. Sc. Paris* 61 (1865) 1142.
[4] Zur Mechanik der Bewegungen von Schlingpflanzen. *Arbeit. Bot. Inst. Würzburg* 1 (1873) 327.

I am indebted to my assistant, Mr. R. B. Espino. Of each of thirteen varieties, and working with a single pure strain in each case, ten roots were placed in darkness on a concrete floor, three in darkness in moderately moist soil, ten in the plant-physiology laboratory on a wooden table beside the windows, and three in the latter place, but in bamboo tubes of soil. The names and numbers of the plants used for these observations are given in Table I.

TABLE I.—*Names and numbers of plants of Dioscorea used in the experiments.*

College No.	Botanical name.	Vernacular name.
88	*D. aculeata* var. *tiliaefolia*	Tugui.
329	*D. alata*	Binaksan ube.
331	*D. hirsuta*	Calut or nami.
938	*D. alata*	Ube.
952	do	Lagkitang-morado.
956	do	Tumque.
958	do	Sinanto.
959	do	Kinahoy na pula.
960	do	Dinaliri.
1094	do	Ube inanislog.
1101	*D. aculeata*	Apari or tugui baliran.
1369	*D. alata*	Ubeng ligao.

For darkness, the photographic dark room was used, since it was at that time, April, needed for no other purpose. The dark room and the plant-physiology laboratory are in the same building. Occasional observations showed the temperature to be the same in the two rooms, and there was no evident difference in humidity during the early part of the experiment. During the latter part of the experiment, the soil in the dark room was not kept moist, so that the air there was drier than previously, while in the laboratory, the air became more humid as the rainy season came on. Therefore, growth during the latter part of the period of observation is not available for a judgment as to the effect of light and darkness on the rate of growth.

With some interruptions, daily growth measurements were made from April 25 to May 26. In presenting statistics of this kind, the use of averages has become usual and one is tempted to present them. With one hundred fifty-six plants in light and an equal number in darkness, it would have seemed that I was working with sufficient material to justify the use of averages.

However, while the behavior of the different plants from the time that a sprout became active until its growth ceased, or at least slackened, had so much in common that in a general way it can be described as uniform in its larger features, there was such irregularity in the time at which this occurred that the difference, which would appear at any time between average growth in darkness and average growth in light, would have been an expression of the number of plants that happened just then to be active, rather than of a difference in growth under the influence of the illumination. Some plants started, reached their maximum rate, and nearly or quite ceased to grow; while others remained quite inactive, but retained their power of growth, as proved by subsequent behavior.

Tables II and III shown the growth in millimeters, for one day, May 8–9 and for one week, May 9–16, respectively, for each of the plants. The exceeding irregularity is seen at the first glance. While these tables contain many blanks, indicating that the plants in question had not begun to grow, there were very few of the entire lot of roots that did not grow before the experiment was discontinued, about the end of June.

There was no rule as to which plants would grow first, except, perhaps, that a large tuber was likely to germinate earlier than a small one; even to this rule, there were so many exceptions that it would not be worth while to pair the tubers by size and to expect them to be comparable in rate of growth at any particular time. Some varieties on the average germinated sooner in darkness and others in light. On the whole, germination of the plants in soil was quicker in darkness than in light. This was possibly due to the soil having been kept wetter in the dark room; but there was no intention to do this. In the light the plants of more than half of the varieties germinated more slowly in the bamboo tubes than on the open table. In spite of this, my conclusion from observation of the whole series is that germination can be hastened somewhat by moisture, but is independent of illumination.

In spite of the diversity of figures in Tables II and III and of the further fact that this diversity would be the same if any other days or weeks were chosen for presentation, I believe that one may conclude from all of the figures that the rate of growth of young shoots of *Dioscorea* is independent of the light. Pfeffer, probably on Sachs's authority, says that this is the case. The average growth of all cultures, as has already been noted, was

greater in the light. But, as also previously suggested, I suspect that this was due to the atmospheric moisture. The average growth of reasonably active plants was usually greater in light than in darkness. Such an average is meaningless, unless the plants compared are at the same stage of the grand period of growth of the shoot being tested; but, if such averages are greater on the one side consistently, day after day, outside conditions may be regarded as responsible. However, there were constantly conspicuous exceptions to this rule, there being at all times from one-third to one-half of the varieties of which the most rapidly growing single plant was in the dark.

TABLE II.—*Growth of tubers of Dioscorea during one day, May 9–10.*

College No.	Illumination.	Growth in millimeters.												
		Without soil. Tuber No.—										In soil. Tuber No.—		
		1	2	3	4	5	6	7	8	9	10	1	2	3
952	Dark					6					6	19	7	4
	Light	11		1		6				2	3			
1369	Dark	12			4		2	7					5	
	Light													
958	Dark	14			8	6				10				
	Light				1		2							
960	Dark	3	5	1	3	4	7	10				40	7	16
	Light		12	33	1	5	31	9	17	4	4			62
331	Dark	9			16		70							26
	Light	5		4	70	157	5	135	4	4	34			
951	Dark	2	5						2	2		12		6
	Light				26	1		6	3					4
88	Dark	13	3	26	10	28	25	2	2		24	39	76	
	Light	116	18	4	159	97	127	26	91	6		91	121	
956	Dark			2			4	2	2		4		61	
	Light	4	1						1					
1101	Dark	9	11	11	2	31	41	5				14	54	71
	Light			120					3	31	3		5	5
329	Dark			7					1	2		32	7	19
	Light	5	13	5	3		18	5	6			5		16
1094	Dark			7				7			1			
	Light	2		12		2				3				
938	Dark								10				7	
	Light	3					1						1	

TABLE III.—*Growth of tubers of Dioscorea during one week, May 9–16.*

College No.	Illumination.	Growth in millimeters.												
		Without soil. Tuber No.—										In soil. Tuber No.—		
		1	2	3	4	5	6	7	8	9	10	1	2	3
952	Dark	8	14	----	2	58	3	----	----	----	----	77	64	111
	Light	70	----	38	----	12	----	----	----	9	----	15	16	----
1369	Dark	----	----	----	5	----	48	4	27	14	----	----	25	----
	Light	----	----	----	----	----	----	----	15	----	----	----	----	----
958	Dark	32	----	9	9	58	9	----	----	28	----	----	40	----
	Light	----	----	----	17	----	9	----	6	----	----	----	----	20
960	Dark	35	65	2	19	33	52	40	----	----	----	519	191	----
	Light	----	115	329	15	121	246	85	137	57	42	42	----	288
331	Dark	109	----	----	309	----	70	----	----	----	----	749	----	419
	Light	15	----	156	701	580	64	717	8	13	306	----	----	----
959	Dark	17	43	----	----	----	9	----	2	----	----	25	50	85
	Light	----	----	5	185	7	----	19	8	5	----	34	----	44
88	Dark	73	29	208	21	312	324	52	11	----	262	286	998	----
	Light	489	74	6	769	320	788	399	338	470	----	743	423	10
956	Dark	----	----	3	----	----	21	22	8	----	11	6	906	8
	Light	9	3	----	----	----	----	----	----	----	----	14	----	----
1101	Dark	160	161	168	16	218	330	79	----	----	----	244	262	344
	Light	----	----	634	116	14	----	----	103	614	61	23	122	149
329	Dark	----	34	42	----	37	----	40	1	5	1	171	50	84
	Light	68	124	17	10	9	159	82	64	----	----	71	----	159
1094	Dark	----	----	51	21	----	----	46	----	----	1	20	84	23
	Light	9	----	69	----	7	14	6	16	19	----	----	----	8
938	Dark	10	16	----	10	7	----	----	86	----	----	----	140	10
	Light	24	----	17	----	20	1	----	----	----	----	35	9	----

During the whole period of experiment, the plants exposed to light reached a decidedly greater average length, as is shown by Table IV.

TABLE IV.—*Length of longest shoot and average of most active plants.*

College No.	In light.		In darkness.	
	Longest.	Average.	Longest.	Average.
	mm.	mm.	mm.	mm.
88	3,860	3,457	1,690	1,321
329	1,967	1,324	860	534
331	4,780	2,540	1,900	1,695
938	2,235	792	1,052	672
952	722	496	582	480
956	865	790	2,844	924
958	2,591	1,454	919	678
959	2,540	1,455	448	----------
960	2,718	1,871	2,150	1,160
1094	1,107	963	421	875
1101	2,661	2,010	875	----------
1369	1,900	1,342	1,130	945

The chief reason for this very considerable difference is not the rate of growth of active plants, but is rather the fact, that after the middle of the time of experiment there was a decided tendency for the plants in darkness to die at the tips. This was perhaps due to the dry atmosphere, perhaps to darkness itself. The death of the tip was usually followed by the appearance of branches. The plants in darkness had usually several axes, either by the branching of the shoot, or by the production of a number of successive shoots from the root; while in light, the plants of most varieties produced a single shoot, which did not branch during the period of the experiment. What would obviously be expected, was true—the plants with one shoot reached a greater length than did equally thrifty plants with several shoots of which only one was measured.

The possibility has just been suggested that the darkness is itself responsible for the blasting of the young tips and their replacement by branches. In the course of the experiment, it happened to nearly all of the plants, which were first to germinate and grow vigorously, that the vigorous shoots gradually grew less rapidly and presently ceased to grow altogether. This happened sooner in darkness, but eventually to many of the plants growing in light. My first impression in the case of the plants in light, which in several cases reached a length of nearly, or quite, two meters before growth ceased, was that the store of food was becoming exhausted or that the distance to which food might be transported from the root to support activity at the growing point had been reached or exceeded. However, it presently developed, that in every case of this kind one or more branches developed soon after the cessation of growth of the first tip and that at least one of these branches grew as actively as the main shoot had previously done and presently exceeded the main shoot in length. The experiment was continued long enough so that some of these branches in their turn ceased to grow in the same manner and were likewise outgrown by other branches. The total length from root to tip of branch was in a number of cases more than twice that of the main shoot.

The plants in the laboratory, although spoken of as exposed to light, were not illuminated as plants are likely to be in nature. It occurs to me, that with anything less than normal illumination it may be natural for the tip of any one stem or branch to cease to grow after a time, unless it comes under conditions quite favorable to development as a permanent main axis of the plant. Under these conditions, the attempt is made next with a branch which at first, at least, follows a different course from the parent

shoot and so tests the possibility of growing into thoroughly favorable conditions, following a different line. If this be the explanation, the dying of the tips in darkness may be a more pronounced expression of the same power of the plant to test out a succession of possible lines of growth, instead of consuming its whole food store in an attempt to reach the light with a single attempt. I have observed that branches of *Dioscorea luzonica*, growing beside my house, reach a limited length and stop rather abruptly under the eaves, but continue to grow much longer and develop as vegetative shoots, if they happen to grow outside the eaves.

Direct, but not very careful, observation seemed to show that the plants in the laboratory grew as fast during the day as during the night or somewhat faster during the day. Doctor McLean kindly checked this observation by the use of the auxanometer with one of the healthy plants of *Dioscorea hirsuta*, No. 331. The results of this test, from 9 o'clock in the morning, May 30, to 9 o'clock in the morning, May 31, with the thermograph reading at the same hours, are shown in Table V.

TABLE V.—*Hourly growth of a healthy plant of Dioscorea hirsuta, No. 331, during twenty-four hours.*

Time.	Growth.	Temperature.	Time.	Growth.	Temperature.
a. m.	mm.	°C.	p. m.	mm.	°C.
9		27	9	6.8	27.8
10	6.8	27.6	10	8.7	27.0
11	8.8	28.5	11	7.8	26.8
m.			12	7.5	25.8
12	8.9	29.5	a. m.		
p. m.			1	6.5	25.5
1	9.1	30.1	2	7.3	25.2
2	8.4	30.8	3	7.0	25.0
3	10.1	31.0	4	6.0	24.9
4	11.3	31.1	5	5.8	24.7
5	11.6	31.1	6	6.6	24.7
6	11.5	30.6	7	6.3	25.9
7	9.5	29.8	8	5.9	26.7
8	9.2	28.6	9	6.4	25.9

The growth of this plant during the daylight hours was conspicuously more rapid than during the night, but the distribution of growth is very evidently much more closely correlated with the temperature than with the illumination, which was stronger during the forenoon than in the afternoon. The slowest growth recorded for any hour was from 7 to 8 in the morning, while the

illumination was not much less than at midday, but the temperature was 4° or 5° lower. This experiment substantiates the opinion previously reached that illumination in itself is practically without direct influence on the rate of growth; but the same experiment demonstrates that temperature has great influence on growth, and suggests that an increase of 5°, say a change from 26° to 31°, is sufficient almost to double the growth rate.

A considerable number of measurements of growth by centimeter zones were made in light and in darkness, using in all cases plants which were among the most rapid in their growth. The general result was that the plants in light had a considerably longer growing region, and that the region of most rapid growth was farther from the apex. A few illustrations will suffice to make this clear.

TABLE VI.—*Growth in millimeters of centimeter zones.*

Centimeter zone.	May 18–19. College No. 88.		May 9–10. College No. 88.		May 9–10. College No. 331.		May 18–19. College No. 960.	
	In light. Dry 9.	In darkness. Soil 2.	In light. Dry 1.	In darkness. Soil 3.	In light. Dry 5.	In darkness. Soil 1.	In light. Soil 6.	In darkness. Soil 2.
	mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
1	5	8	3	7	3.5	5	3	----
2	8	14	10	14	5.5	7		3
3	7	17	10	16	10	9	2	13
4	4.5	20	12	8	10	16	2	3.5
5	4	16	10	3	11	19	2	2
6	4	13	9	0.5	12	17	2	0.5
7	3.5	12	7	0.5	12.5	10	2	----
8	4.5	9	4	----	10	9	2	----
9	3	8	4	----	10.5	8	1.5	----
10	2.5	7	3	----	10	5	1.5	----
11	2.5	4.5	4	----	10	3.5	1	----
12	3	3	3.5	----	8	1.5	1	----
13	2	2	3	----	8	1.5	1	----
14	1.5	2	2.5	----	7	1	0.5	----
15	1.5	1	3	----	6	----	0.5	----
16	1	0.5	3	----	4.5	----	----	----
17	1	----	3	----	4.5	----	----	----
18	1	----	2.5	----	4	----	----	----
19	1	----	3	----	3	----	----	----
20	0.5	----	2.5	----	3	----	----	----
21	0.5	----	3	----	2	----	----	----
22	0.5	----	2	----	1.5	----	----	----
23	0.5	----	2	----	0.5	----	----	----
24	0.5	----	2	----	----	----	----	----
25	----	----	2	----	----	----	----	----
26	----	----	1	----	----	----	----	----
27	----	----	1	----	----	----	----	----
28	----	----	----	----	----	----	----	----

In all of the pairs of plants tested, it happened only once that the plant in darkness showed a longer growing region than that in light; in this case, the plant in light proved to have a surprisingly short growing region. It happened repeatedly in the course of these observations of paired plants that the plant in darkness showed greater total growth than the plant in light and yet showed a much shorter growing region, in some cases less than half as long.

We have here, I believe, the whole of the immediate explanation of the conclusion of Professor Newcombe:[5]

> Die ummittelbare Ursache des Verlustes des Windens ist der Verlust des einseitigen Wachstums im Stamme eine beträchtliche Entfernung rückwärts von der Spitze—bei den meisen der beobachteten Pflanzen mehrere Zentimeter rückwärts von der Spitze.

It is not merely that this zone on the stem loses the faculty of one-sided growth; the region that would execute the circumnutating movement in light almost *ceases to grow at all* in darkness or does actually cease entirely to elongate. In Pfeffer's Physiology, volume II, page 13, I find the citation of a paper by Strehl said to show that the elongating region is longer in etiolated than in normal stems. I have been unable to check this by reference to the original publication, which is a Leipzig doctor's thesis of 1874. Without testing at all a variety of stems, I strongly suspect that the condition I have found in *Dioscorea* will turn out to be quite general. On the one hand, it can be harmonized easily with my old observation,[6] that the turgor of etiolated stems is less than that of normal stems. The lower turgor in the zones which lie beneath that of rapid growth may well be associated with a cessation of growth prompter than would occur if the turgor were higher.

On the other hand, the short elongating region of stems in darkness invites biological interpretation. It is an old and, I believe, generally accepted idea that the rapid elongation of etiolated or etiolating stems is a response to darkness that has been selected and fixed and is, therefore, inherited, because this rapid growth is likely, in nature, to result in the shoots' reaching light sooner than they would do at the normal rate of growth or in reaching light from positions where the normal rate and manner of growth would result in exhaustion before light could be reached. The typical phenomena of etiolation are best shown

[5] Op. cit., p. 523.

[6] Ueber den Einfluss von Licht und Temperatur auf den Turgor. Halle (1895).

by seedlings, and in this work with *Dioscorea* I am working with stems analogous to the primary stems of seedling plants. The primary stem of seedlings most frequently finds itself in darkness because buried by the soil; rapid growth is nature's method of bringing the shoot to the light before the exhaustion of its food store. If etiolation is an adaptive phenomenon, selected primarily because it preserved plants that germinated below the surface of the ground and enabled the growing point to reach and pass the surface, then a short growing region is just as natural a feature of this phenomenon as is rapid growth in length. The short growing region of the etiolated stem is explained then in a biological sense just as is the relatively short growing region of roots. A structure elongating where mechanical resistance is likely to be encountered has need to be short, as compared with the growing region of other structures, which elongate in the atmosphere and normally have no outside mechanical resistance to overcome.

I have made no experiments with the change in length of growing region and manner of growth, when plants are taken from the light to the dark room. When plants are brought from the dark room and exposed to the light, the growing region becomes longer. This lengthening of the elongating region (if I may use the same word twice together in different senses) consists in the retention of the power to elongate on the part of the zones that in darkness would cease to grow in length. This is easily tested by measuring the same zones for successive days. Under constant external and internal conditions, the length of the zones that cease to elongate during any day is naturally approximately equal to the increase in length on the same day. If a plant be brought from the dark room into the open laboratory, it may happen that no zone ceases to grow during the next day or even two days; and in any case, the length of the region that ceases to grow is much less than the daily increment. Thus, in the case of *Dioscorea hirsuta,* May 23, plant No. 3 on the floor of the dark room was brought into the open laboratory. During the following day, it grew 6.8 centimeters and the region which ceased to grow was only 2.25 centimeters long. The increase in length of the elongating region continues until the normal length for a plant growing at the same rate in light is reached. This seems likely to be accomplished in about three days.

The remeasurement of zones on successive days is a valuable test of the accuracy of one's measurements and observations by these methods. It has just been suggested that if on successive days measurements are made of the distance between the same

marks, growth should cease each day at the back end of the growing region, in zones having a total length about equal to the day's total growth. I noticed years ago, that published figures by as careful a worker as Sachs do not stand this test, but that, if one might judge from the figures, the total elongating region is much longer on the second day than it was on the first. Since noticing this, I have always made it my practice to check measurements occasionally by remeasurement after a second day. This kind of check is illustrated by the measurements on plant "Light Soil No. 1," *Dioscorea hirsuta* No. 331, May 23–25, shown in Table VII.

TABLE VII.—*Growth of the same zones on successive days.*

[*Dioscorea hirsuta*, Light Soil No. 1, May 23–25.]

Centimeter zone.	Growth, first day.	Growth, two days.	Centimeter zone.	Growth, first day.	Growth, two days.
	mm.	*mm.*		*mm.*	*mm.*
1	5		14	6	6
2	8		15	5	5
3	12		16	4	
4	12		17	3	
5	14		18	2.5	13.5
6	15		19	2	2
7	19	34	20	2	
8	19	26	21	1.5	
9	15	17	22	1	
10	14	15	23	0.5	
11	12	13	24	0.5	
12	9	9	25	0.5	
13	8	8	26		

Analyzing these figures, it appears that the growing region the first day was 25 centimeters long. At the end of the second day, zone 11 extended 25.4 centimeters from the apex, and was the last zone that showed any increase in length. In other words, the figures checked in this case and the length of the growing region was unchanged.

Many of the plants in darkness had a short apical portion rather sharply bent. This was usually not more than 1.5 centimeters in length. Repeated observation showed that the movement of these apical segments was quite irregular, which agrees with Newcombe's observations. The most remarkable behavior shown was that of occasional plants that kept the bent part at nearly the same angle and in the same direction, while the stem as a whole was growing. The movement of this apical part resulted sometimes in a twisting of the stem and at the other times did not do so. *Dioscorea alata* is a remarkably convenient subject for the observation of twisting.

While the growth farther from the apex, which would have produced nutation and twining, ceased in most plants in darkness, the length of growing region and the activity of zones somewhat remote from the apex did not change uniformly. If this region was especially active, nutation was possible very much as in light. In a number of stems in darkness, always especially vigorous specimens, there was an unmistakable movement, apparently in the distinctive form of normal nutation; and in a single case, *Dioscorea aculeata* No. 88, dark soil No. 3, the main stem being broken and replaced by a very vigorous branch, the latter, during the three days preceding May 16, wound three times around a stick of wood in a perfectly regular spiral.

Growth is a complicated process. Defined as a change in form or size, it of course includes metabolic processes that find no expression in the definition. Environmental conditions that find an expression in growth may do so in a variety of ways, which have hitherto escaped adequate analysis. Aside from metabolism taking place in the region or structure that actually grows, the growth of higher plants is dependent in all cases upon changes taking place elsewhere in the plants. In the case of the yams, the growth of the distal part of the growing shoot depends upon the metabolic processes taking place in the food store, by which the food is made available for removal, and upon the translocation of this food from the place of storage to the place of use.

It has already been indicated that the rate of growth varies with the temperature. Aside from the effect of temperature exerted directly on the growing region, which effect may itself be subject to analysis, temperature may have an influence upon the preparation of the food for translocation or on the rate of translocation itself. For the analysis of the problem into three phases—metabolic processes in the food store, translocation, and processes in the growing region itself—*Dioscorea* is an especially suitable subject for study. The experiments that I have made along this line are no more than introductory. However, the question is an important one, and the methods are believed to be worthy of general use. For these reasons, the tentative and inclusive experiments already made are reported here.

The investigation of the influence of temperature on the processes taking place in the food store was made by the very simple and obvious device of inserting a part of the tubers in ice water, and comparing the growth of the corresponding shoots with that of the shoots of plants, the whole of which were kept under ordinary laboratory conditions. The results of this experiment are recorded in Table VIII, showing the growth of plants of

Dioscorea hirsuta No. 331, of which 6*a*, 6*b*, 9, and 10 had the tubers in ice water, while the remaining plants were not so treated. The second horizontal line of growth figures shows the growth from May 26 at 5 o'clock in the afternoon to May 28 at 10 o'clock in the morning at which hour the ice water was applied. The remaining figures indicate the growth in millimeters during the preceding time-interval.

TABLE VIII.—*Effect of cold on tubers of Dioscorea hirsuta No. 331.*

[Measurements are recorded in centimeters.]

	Growth of stem. Tuber No.—												
	2*a*	2*b*	3	4*a*	4*b*	5	6*a*[a]	6*b*[a]	6*c*	7	8	9[a]	10[a]
Length of shoot, May 28	47	34	92	128.6	82.3	87.1	71.9	68.8	28.9	40.5	54.9	70.2	50
Growth, from May 26 at 5 p. m. to May 28 at 10 a. m	14.0	12.0	25.6	17.2	14.7	27.9	15.4	15.2	3.5	18.8	28.8	28.1	12.6
Additional growth:													
May 28, at 11.40 a. m	1.0	0.7	1.5	1.1	1.0	0.8	0.6	0.4	0.1	0.9	1.3	1.0	0.3
May 28, at 1.40 p. m	1.2	1.0	1.4	0.7	0.9	1.4	0.5	0.5	0.4	1.3	1.2	0.5	0.3
May 28, at 3.40 p. m	1.1	1.0	1.4	0.7	1.0	1.0	0.4	0.4	0.1	1.0	1.4	0.6	0.3
May 28, at 5.40 p. m	1.1	0.9	1.4	0.5	0.5	1.1	0.2	0.0	0.2	1.1	1.1	0.3	0.0
May 28, at 7.40 p. m	0.9	0.9	1.0	0.3	0.6	1.0	0.2	0.1	0.2	0.8	1.1	0.2	0.1
May 29, at 7.40 a. m	4.8	3.2	3.3	2.0	2.6	5.6	0.2	0.3	0.0	5.3	4.6	0.4	(b)
May 30, at 7.40 a. m	14.3	11.1	16.1	9.7	10.2	16.2	0.4	0.5	0.1	-----	13.9	0.6	-----
May 31, at 5 p. m	22.6	18.7	24.1	18.3	16.8	21.3	6.0	8.4	0.3	-----	25.0	5.9	-----
June 6, at 11 a. m	70.4	80.7	83.4	62.9	40.2	48.9	54.1	79.9	28.1	-----	81.2	62.0	-----

[a] Tubers in ice water. [b] Injured.

As Table VIII shows, the effect of chilling the food store was shown with considerable promptness in the rate of growth, even when the growth was occurring at a distance of more than 1 meter. The figures near the bottom of the table show that, after the food stores were permitted to become warm, there was a prolonged after-effect of the chilling. However, this cannot have been due to any permanent injury, such as killing the food stores or many of their cells, for the ultimate growth was at about the same rate in all of the plants; and it occurred at about the same rate, whether or not the roots were immersed in water.

To test the effect of cold upon the rate of translocation, double glass tubes, 20 centimeters in length, were prepared, the inner tube containing the stem and being so small that the stem nearly filled it, and the outer tube carrying a stream of water which ran from a can containing ice. As I set the experiment up, it was impossible to lower to below 8° the temperature of the water leaving the outer tube. The temperature in the inner tube was

practically the same. At this temperature, there was no considerable checking of the rate of growth. When I succeeded in keeping the temperature constantly at 8°, growth seemed to be influenced slightly, but when it rose to 16°, growth was not appreciably different from that of the control stems at a temperature throughout of, say, 26°. Better arrangement of the experiment would of course effect temperature down nearly to the freezing point. To do this temporarily, I disjointed the outer tubes and fill them with shaved ice, and kept this up, renewing the ice constantly, for a period of two hours. The effect of this was to check the growth quite appreciably, and this effect continued, and finds expression in the growth during the twelve hours from 7.30 at night, May 28, to 7.30 the following morning. During the ensuing twenty-four hours, the plants which had been subject to local chilling grew faster than the control plants, which may be construed as merely showing that the effect of the treatment had been completely overcome. Details of this experiment are shown in Table IX.

TABLE IX.—*Effect of cold on stems of Dioscorea hirsuta.*

[Measurements of growth are recorded in centimeters.]

Date.	Tuber No.—				Remarks.
	1	6 *a*	6 *b*	9	
May 25–26	18.0	14.1	12.5	14.1	
May 26–27	20.6	13.2	14.6	14.9	
May 27, 5 p. m., to May 28, 9 a. m.	6.7	4.9	6.6	5.9	Cold water turned through 6 *b* and 9; temperature at 9.20 a. m., 6° C.
May 28:					
9 a. m	[a]161.0	[a]164.3	[a]128.2	[a]134.0	
11.30 a. m	1.7	0.6	1.5	1.3	Room temperature at 10.30 a. m., 26° C. Water slowed at 12 m., temperature then, 8°.
1.30 p. m	0.9	0.7	1.4	1.0	Temperature at 1 p. m: Room, 28°; 6 *b*, 16°: 9, 19°.
3.30 p. m	1.3	0.8	0.7	0.9	Temperature at 3 p. m.: Room, 27°; 6 *b* and 9, 8°. At 3.15 flow was checked in 9, temperature, 16°; corrected, dropped to 8°.
5.30 p. m	1.3	0.7	0.8	1.0	Temperature at 4.20: Room, 28°; 6 *b* and 9 (outflow), 8°.
7.30 p. m	0.9	0.8	0.3	0.6	Shaved ice put in place of cold water, 5.30 to 7.30; temperature then about 3°. Room temperature at 7.30 was 27.5°.
May 29, 7.30 a. m	4.6	2.3	1.1	2.1	
May 30, 7.30 a. m	8.9	8.1	10.6	11.5	
May 31, 5 p. m	8.6	7.7	15.3	8.1	
June 6, 10 a. m	31.6	21.9	65.3	46.8	

[a] Total length at 9 a. m., May 28.

SUMMARY

1. Previous observations, that a nutation of shoots of *Dioscorea* ceases in darkness, are in general correct.

2. Especially active stems may nutate and twine around a support in darkness.

3. Professor Newcombe's observation that the failure to twine in darkness is due to changes a number of centimeters from the apex is correct.

4. The rate of growth of vigorous young shoots is but slightly, if at all, influenced by the illumination.

5. The elongating region is much shorter in darkness than in light. The part of the stem which executes the movements, in active nutation in light, almost, or quite, ceases to elongate in darkness, and it is for this reason, that twining ceases in darkness.

6. The short elongating region in etiolated shoots may be explained biologically as a selected adaptation to the condition under which young shoots in nature are most likely to find themselves in darkness—this is, in the soil, where a long growing region would be just as dangerous as the production of ample leaves.

7. The growing shoots of *Dioscorea* are excellent material for the analysis of the influence of temperature or other external conditions upon growth, into:

A, effect on the growing region;
B, effect on the metabolic processes, which make food available; and
C, translocation of food to the growing region.
Low temperatures, applied either to the food store, or to the stem through which the food must pass to the growing region, result in prompt checking of growth.

8. It is suggested that the blasting of the growing point and its replacement by a branch, which at first grows at a right angle to the axis from which it springs, is a selected phenomenon, by which the plant, the shoot of which is under unfavorable conditions, tests a wholly different line, instead of using itself up in one attempt to reach a place where conditions are good.

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RELIQUIAE ROBINSONIANAE

By E. D. MERRILL [1]

(*From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.*)

A critical investigation of Rumphius's [2] "Herbarium Amboinense," a pre-Linnean publication of preëminent importance and one of the classical works on Malayan botany, shows that about three hundred fifty binomials have been based wholly on its descriptions and figures since the establishment of the binomial system in 1753. As Rumphius's descriptions, while often ample, are non-technical; as the figures are not infrequently crude; as the arrangement of his material follows no definite system of classification; and as there is no extant botanical material representing the plants that he described and figured, the matter of properly interpreting numerous species that are typified by his descriptions and figures is a very complicated one, and is a subject that has not been given the attention that it warrants by modern botanists.

In organizing the botanical work for the Philippine Government I was confronted with a similar problem in connection with the proper interpretation of the numerous species described by Blanco in his "Flora de Filipinas," [3] species, like those based on Rumphius's work, that are not represented by extant botanical material. Field work in the Philippines with special reference to the data assigned by Blanco to the various species has enabled me definitely to determine the status of a very high percentage of them.

In the Philippines, as in all other parts of the Indo-Malayan region, the systematic botanist is very frequently confronted with the problem of interpreting species based on forms figured and described by Rumphius. As the work on the Philippine

[1] Associate professor of botany, University of the Philippines.

[2] Rumpf, G. E. Herbarium Amboinense, plurimas complectens arbores, frutices, herbas, plantas terrestres et aquaticas, quae in Amboina et adjacentibus pereriuntur insulis, adcuratissime descriptas juxa earum formas cum diversis denominationibus, cultura, usu ac virtutibus, etc. Amsterdam, volumes 1 to 7 (Auctuarium) 1741–55.

[3] Blanco M. Flora de Filipinas (1837) LXXVIII+1–887; ed. 2 (1845) LXIX+1–619; ed. 3, 1-4 (1876–83).

flora progressed, it became increasingly evident that, in order to establish a stable basis of nomenclature for numerous Philippine species, a botanical exploration of Amboina was urgently needed. Plans for this proposed work were prepared in the latter part of 1912 and the early part of 1913, and the actual work of the botanical exploration of Amboina was assigned to the late Dr. C. B. Robinson, at that time assistant botanist in the Bureau of Science. Doctor Robinson left Manila on June 17, 1913, and proceeded to Amboina via Buitenzorg, Java. He arrived in Amboina July 15, 1913, and actively prosecuted his field work there until the day of his untimely death, December 5, 1913. On this day, while on a botanical trip, unaccompanied, he was murdered by some Boetonese men who had established a small settlement between Aerlo and Seri, about fifteen kilometers from the town of Amboina. An investigation of the case by the local authorities has definitely shown that Doctor Robinson's death was wholly due to a local superstition.[4]

During the time that Doctor Robinson was in Amboina, and including a few species that he secured, enroute, at Boeleleng, Bali; Baoe-baoe, Beoteon; and Macassar, Celebes, he collected approximately 1,750 numbers of plants, most of the numbers being represented by abundant duplicate material. The collections were approximately arranged in two groups by Doctor Robinson, during his stay in Amboina; first, those that could definitely or fairly definitely be referred to species described by Rumphius; and, second, those species that were not described by Rumphius. Of the first group there are approximately 600 numbers, and these have been arranged in a special series, *Plantae Rumphianae Amboinenses*, and will be distributed with special labels giving both the modern binomial and the Rumphian name and reference for each species. This material has been utilized in the preparation of a special report in an attempt to interpret the species described in the Herbarium Amboinense, now practically completed. The material arranged in the second group, *Reliquiae Robinsonianae*, that is, those species not described by Rumphius, is the basis of the present paper.

As the work in Amboina was originally planned, it was our intention that Doctor Robinson should remain in the field for a period of about five months. As the work progressed, it became evident to him that he could not hope to solve any where near all the problems presented by the identification of the Rumphian

[4] Merrill, E. D. Charles Budd Robinson, Jr. *Philip. Journ. Sci.* 9 (1914) *Bot.* 191–197.

species, and on the basis of data supplied by him, arrangments were made to extend his time in Amboina until the first of June, 1914, thus giving him nearly a year in the field. The work he actually accomplished in his four and one-half months in Amboina has been of inestimable value in determining the status of the numerous Rumphian species, but his collections would have been far more valuable had he been spared to complete his task.

It was no part of my plan to work this Amboina material, for the final reports were to have been prepared for publication by Doctor Robinson. However, owing to the unforeseen and unfortunate ending of the Amboina exploration it has devolved upon me to complete the work that was made possible by the material and data secured by Doctor Robinson.

The present contribution is not, and from its very nature cannot be considered, more than a mere contribution to our knowledge of the flora of Amboina. None of the numerous species described and figured by Rumphius are included. However, under the circumstances associated with the untimely death of Doctor Robinson, it has been deemed expedient to compile an enumeration of the miscellaneous material included in his collections. While the enumeration is practically complete for higher plants represented in the *Reliquiae Robinsonianae* series, this statement does not hold true for the cellular cryptogams. In the *Reliquiae Robinsonianae* series there are 1,142 numbers—nearly twice as many as in the *Plantae Rumphianae Amboinenses*. About 217 of these are fungi; 72 are mosses; 54, hepatics; and 14, algae. Owing to the unsettled conditions brought about by the present war, it has not been possible to include in the present paper more than an enumeration of the lichens among the cellular cryptogams. The manuscript report on the mosses, prepared by Doctor Brotherus, of Helsingfors, Finland, has been lost or destroyed in transit; the hepatics have not been submitted to any specialist; the algae still remain unidentified; while the report on the fungi, which were placed in the hands of Doctor Sydow only after many difficulties had been overcome, and then only after the third attempt, has been retained either for publication in Europe or for transmission when conditions shall have again become normal. Likewise, in the present paper, the *Pteridophytes* have not been included, as these plants have already been enumerated by Captain C. R. W. K. van Alderwerelt van Rosenburgh.[5] Reports on the *Orchidaceae*

[5] The Amboina Pteridophyta collected by C. B. Robinson. *Philip. Journ. Sci.* 11 (1916) *Bot.* 101–123, *t. 5, 6.*

and on the *Rubiaceae* are not available for publication at the present time. All the material of the *Orchidaceae* is in the hands of Doctor J. J. Smith, and of the *Rubiaceae* is in the hands of Dr. Th. Valeton for study.

In the present enumeration the vast majority of the species included are those already described by the other authors. The percentage of novelties in the collection is small, as was to be expected from a small island that has been visited by so many botanists as Amboina, for Amboina is classical ground in Malayan botany. The work of most botanists and collectors in Amboina, however, has been confined for the most part to visits of from a few days to a few weeks, and it is apparent that a considerable amount of Amboinan botanical material still remains in various herbaria unidentified. A few new species have been proposed; namely, about twenty-three by myself in various groups, two species of *Piper* by M. C. de Candolle, and three species of lichens by Mr. G. K. Merrill. The collection has supplied material by which the status of several of Roxburgh's species, based on material originating in Amboina or in the Moluccas, and which were very imperfectly described, can definitely be determined, quite apart from the value of the specimens placed in the other series, *Plantae Rumphianae Amboinenses*, in determining the status of the very numerous species based on Rumphius's descriptions and figures.

Like many other parts of the Malay Archipelago, the vegetation of Amboina has been much changed since the time that Rumphius wrote his Herbarium Amboinense. It is evident that the forests were then much more extensive than they are to-day. As the population has increased, the virgin forest has been destroyed to make way for cultivated lands, and it is very probable that in Amboina, as certainly in the more densely populated Island of Java, species more or less common in Rumphius's time, have since been exterminated or at least have become very rare and local. The virgin forest supports a type of vegetation entirely different from that of the settled areas and the second-growth forests, and as a rule, this type of forest, when once destroyed in the Malayan region, is never replaced by the same type of vegetation, or if replaced, the original species grow again only after the lapse of many years.

As the present contribution is by no means a study of the flora of Amboina as a whole, it is hardly the place to discuss the characteristics or the relationships of the flora. It is very probable that eventually the island will present a very small endemic

flora, yet at the present time a fairly high percentage of species enumerated are known only from Amboina. Due to the proximity of other islands, and to the backward state of our knowledge of the flora of the Moluccas as a group, it is only reasonable to expect that an intensive exploration of the neighboring islands will yield most of the species that are now known only from Amboina.

The flora is, of course, a typical Malayan one. It contains some Australian types, but most of these are rare or at the best are nowhere dominant, quite as similar Australian types are found in the Philippines. Among these may be included *Flindersia, Eucalyptus, Stackhousia, Schizomeria,* and, perhaps, representatives of a few other genera. Like other parts of the Moluccas, Celebes, and New Guinea, the Amboina flora presents a striking similarity to that of the Philippines, not only in its species, but also in its genera. In one of Doctor Robinson's letters, he mentions the fact that so far as the general type of the vegetation was concerned, and for that matter most of the genera and very many of the species encountered, he might as well be in the Philippines as in Amboina. In the course of the study of this material a number of species have been detected that were previously reported only from the Philippines, among these being *Thoracostachyum lucbanense* Kükenth., *Abelmoschus mindanaensis* Warb., *Gyrinopsis brachyantha* Merr., *Dysoxylum euphlebium* Merr., *Polypodium merrillii* Copel., *Litsea perrottetii* F.-Vill., *Hypoestes laxiflora* Nees, *Pratia ovata* Elm., *Erycibe lateriflora* Elm., and *Aglaia multifoliola* Merr. The Amboina species *Callicarpa pentandra* Roxb. proves to be indentical with *Geunsia hookeri* Merr., of the Philippines, and Roxburgh's specific name is hence adopted. *Polygala polifolia* Presl, previously known only from Luzon, the Caroline Islands, and New Guinea, appears in our Amboina collections, as do *Clerodendron macrostegium* Schauer, previously known only from the Philippines and Ceram, and *Stackhousia intermedia* Bailey var. *philippinensis* Pamp., a characteristic Australian type, previously known from Luzon and Guimaras in the Philippines, Yap, in the Carolines, and the only known representative of the family north of Australia.

The discovery of a representative of the genus *Gyrinopsis* in Amboina, the genus otherwise known only from the Philippines, adds another name to the already long list of genera that are known only from the Philippines and the islands to the south and southeast of the group, including: *Cubilia, Gyrinopsis, Sararanga,*

Microlaena, Ascarina, Phrygilanthus, Spiraeopsis, Clianthus, Wallaceodendron, Koordersiodendron, Reinwardtiodendron, Strophioblachia, Neotrewia, Oncocarpus, Pleiogynium, Tristira, Osbornia, Anompanax, Lepiniopsis, Dedea, Dolicholobium, Eucalyptus, Pimelea, Euphorianthus, Vavaea (also in Java), *Xanthostemon, Schuurmansia, Ganophyllum, Uncinia, Normanbya, Pothoidium, Macropsychanthus, Tetraplasandra* (also in Hawaii), *Couthovia, Nycticalos, Calogyne* (also in southern China), *Phacelophrynium,* and *Paralstonia.* Here we have a list of nearly forty genera, many of them monotypic, and very few that contain numerous species, confined to the Philippines and to the islands to the south and southeast. No list at all approaching this can be compiled for the Philippines and the islands to the west and southwest, or the Sunda Islands proper, including also the Malay Peninsula. A similar list of genera confined to this area would include practically only *Eusuderoxylon, Philbornea, Koompassia, Kunstleria, Clemensia, Polytrema, Hallieracantha, Monophyllea,* and *Adinabotrys* (*Whitfordiodendron*).

As to the limited distribution of species, the special distribution between the Philippines and the islands to the south and southeast is strongly developed, in close correspondence with the special generic relationships, while that with the islands to the west and southwest is correspondingly weak. So far as deductions can be drawn on the basis of our present knowledge of the Philippine and Malayan floras, the evidence preponderatingly points to a closer connection between the Philippines and the regions to the south and southeast than with the islands to the west and southwest of the Archipelago. At any rate, the evidences of floristic relationships between the Philippines and Celebes and the Moluccas is so great that the systematist working on the flora of either area should give special attention to the species already described from the other area in working up his material.

In connection with the present enumeration of Amboina plants included in the series *Reliquiae Robinsonianae,* I am indebted to Doctor O. Beccari, Florence, Italy, for the determination of the palms; to M. C. de Candolle, Geneva, Switzerland, for the treatment of the genus *Piper;* to Doctor Th. Valeton, Buitenzorg, Java, for the treatment of the *Marantaceae;* to J. Sykes Gamble Esq., East Liss, Hants, England, for assistance in determining the identity of the single bamboo enumerated, and to Mr. G. K. Merrill, Rockland, Maine, U. S. A., for the consideration of the lichens.

The present paper, as noted above, is based on the material that cannot definitely be referred to any of the forms figured or described by Rumphius. The most important results of the work of Doctor Robinson in Amboina are to be included in the general report on the species of the Herbarium Amboinense, to be issued in the near future under the title: "An Interpretation of the Herbarium Amboinense."

In closing this introductory statement I would call attention to the fact that through the interest of Doctor J. C. Koningsberger, director of the Botanical Garden, Buitenzorg, Java, Doctor Robinson's work in Amboina was greatly facilitated by the detail of a native assistant from Buitenzorg, the mantri Mardjoeki, to aid him in the collection and preparation of material. The work done by Doctor Robinson in Amboina was in a way coöperative between the Bureau of Science on the one hand, and the Botanical Garden at Buitenzorg, Java, on the other. It is hope that the work accomplished will be to the mutual benefit of both institutions, as well to botanists and other botanical institutions in the world at large.

ENUMERATION OF THE SPECIES

ALGAE

This group is rather poorly represented in Doctor Robinson's Amboina collection, 14 numbers being included in the series *Reliquiae Robinsonianae,* all, or nearly all, marine forms. No report on this material is available for publication.

FUNGI

There are about 217 numbers of fungi included in the series *Reliquiae Robinsonianae,* for the most part minute parasitic forms. This material has been placed in the hands of Doctor Sydow for study, but owing to the exigencies of the present European war, no report is available for publication at this time.

LICHENES

(By G. K. Merrill)

MICROTHELIA (Koerb.) Massalongo

MICROTHELIA GREGARIA G. K. Merr. sp. nov.

Thallus subcortical, effuse, fulvo-fuscous; apothecia collected in trypethelioid stromas, blackish and of irregular shape; perithecia immersed, the black ostiole with a surrounding area of whitish tissue only visible, entire; spores 8, fuscous or decolorate, bilocular, one cell cuneate, the other rounded, 22 to 25 by 8 to 11 μ; asci ventricose; paraphyses distinct, filiform.

Amboina, Lateri, *Rel. Robins. 2435,* on branches of *Eugenia,* altitude 200 meters, August 25, 1913.

PYRENULA (Ach.) Massalongo

PYRENULA MARGINATA (Hook.) Müll.

AMBOINA, Batoe merah River and Hoetoemoeri road, *Rel. Robins. 2410, 2413*, on living and dead tree trunks, altitude about 200 meters, September, 1913.

PYRENULA NITIDA (Weig.) Ach.

AMBOINA, Hitoe lama, *Rel. Robins. 2426,* on trunks of living trees, altitude 200 meters, October, 1913.

PYRENULA SEXLOCULARIS (Nyl.) Müll.

AMBOINA, Mahija, *Rel. Robins. 2416,* on trunks of living trees, altitude about 200 meters, August, 1913.

PHYLLOPORINA Müller

PHYLLOPORINA (STEGESTRINULA) OCTOMERA Müll.

AMBOINA, Hitoe messen and Way uri, *Rel. Robins. 2418 p. p., 2430, 2444 p. p.* On leaves of various trees at low and medium altitudes.

PHYLLOPORINA (STEGEDIASTRUM) MULTIPUNCTATA G. K. Merr. sp. nov.

Thallus rounded, or difform by the confluence of several individuals, effuse, filmy, nebulous at the circumference, lead or ashy-lead in color; perithecia numerous, minute, hemispheric-conoid, ostiole very minute, dimidiate; spores 4- to 6-locular, fusiform, 15 to 17 by 4 to 4.5 μ; paraphyses distinct, lax, filiform; asci clavate-cylindric. Epiphyllous and associated with *Phyllosporina octomera.*

AMBOINA, Hitoe messen, *Rel. Robins. 2418 p. p.*, associated with *P. octomera* Müll. On leaves of trees, altitude about 150 meters.

STRIGULA E. Fries

STRIGULA ELEGANS Fée.

AMBOINA, Ayer putri, *Rel. Robins. 2195*, on leaves of trees at low altitudes, July, 1913.

STRIGULA FEEI Mont.

CELEBES, Macassar, *Rel. Robins. 2473*, on leaves of *Mangifera indica*, July 11, 1913.

STRIGULA COMPLANATA var. CILIATA (Mont.) Müll.

AMBOINA, Kati-kati, *Rel. Robins. 2411*, on leaves of *Heritiera litoralis*, October, 1913.

ARTHRONIA (Ach.) A. Zahlbruckner

ARTHRONIA ROBINSONII G. K. Merr. sp. nov.

Parasitic on the thallus of *Phyllosporina* (*Stegestrinula*) *octomera* Müll. Apothecia rounded or difform-rounded, black, plane or slightly convex, scabrous; spores 8, oblong-ellipsoid, 10- to 12-

locular, 34 to 36 by 9 to 11 μ, colorless; asci saccate; paraphyses deficient. Epiphyllous.

AMBOINA, town of Amboina, *Rel. Robins. 2414*, on leaves of *Garcinia mangostana*, July 17, 1913.

BIATORINOPSIS Müller

BIATORINOPSIS FOLIICOLA (Kremp.) Müll.

AMBOINA, *Rel. Robins. 2442 p. p.*, associated with *Lopadium epiphyllum* Mont. on leaves of *Agathis alba.*

COENOGONIUM Ehrenberg

COENOGONIUM INTERPLEXUM Nyl.

AMBOINA, Hitoe messen, *Rel. Robins. 2434, 2438*, on trees, altitude about 300 meters, October, 1913.

LOPADIUM Koerber

LOPADIUM EPIPHYLLUM Müll.

AMBOINA, *Rel. Robins. 2442 p. p.*, associated with *Biatorinopsis foliicola* Müll. on leaves of *Agathis alba.* CELEBES, Macassar, *Rel. Robins. 2474*, on leaves of *Citrus decumana.*

LEPTOGIUM (Ach.) A. Gray

LEPTOGIUM PHYLLOCARPUM var. **DAEDALEUM** (Flot.) Nyl.

AMBOINA, Roemah tiga, *Rel. Robins. 2440*, on trees at low altitudes, July 20, 1913.

LEPTOGIUM TREMELLOIDES var. **AZUREUM** Nyl.

AMBOINA, Kati-kati, *Rel. Robins. 2427*, on trunks of coconut palms at low altitudes, October 6, 1913.

PANNARIA Delise

PANNARIA PANNOSA (Sw.) Del.

AMBOINA, Kati-kati and Way uri, *Rel. Robins. 2443, 2444, p. p.*, on trunks of coconut palms and on leaves of *Eugenia*, September and October, 1913.

PANNARIA FULVESCENS (Mont.) Nyl.

AMBOINA, Roemah tiga, *Rel. Robins. 2423*, on trunks of trees, August, 1913.

COCCOCARPIA Persoon

COCCOCARPIA CILIOLATA Mont.

AMBOINA, Soja, Roemah tiga, and town of Amboina, *Rel. Robins. 2417, 2436, 1237*, on trunks of trees at low altitudes.

COCCOCARPIA HOMALANTHA Nyl.

AMBOINA, Amahoesoe and Lateri, *Rel. Robins. 2406, 2421*, September, 1913, on living and dead branches of trees.

COCCOCARPIA PELLITA (Ach.) Müll.

AMBOINA, Kati-kati, *Rel. Robins. 2424, 2428*, on branches of *Timonius sericeus* at low altitudes.

PARMELIA De Notaris

PARMELIA SULPHURATA Nees & Flot.

AMBOINA, near the town of Amboina, *Rel. Robins. 2422*, on tree trunks near the seashore, October 8, 1913.

PYXINE Nylander

PYXINE COCOES (Sw.) Nyl.

AMBOINA, Kati-kati, *Rel. Robins. 2432, 2446*, on trunks of *Cocos nucifera*, October 6, 1913.

HEPATICAE

There are about 54 numbers of *Hepaticae* in the series *Reliquiae Robinsonianae*. It has been impossible to secure a report on this material from any specialist, and accordingly no attempt has here been made to enumerate the various species.

MUSCI

The mosses are represented in the *Reliquiae Robinsonianae* by about 72 numbers. A report on this material, prepared by Doctor Brotherus, forwarded in December, 1915, failed to reach me and has apparently been lost or destroyed in transit.

PTERIDOPHYTA

The *Pteridophyta* of Doctor Robinson's collection have already been considered in a separate paper by Captain C. R. W. K. van Alderwerelt van Rosenburgh,[6] and those species apparently not described by Rumphius are accordingly not here enumerated. The groups represented in the collection are the *Hymenophyllaceae, Cyatheaceae, Polypodiaceae, Matoniaceae, Gleicheniaceae, Schizaeaceae, Marattiaceae, Ophioglossaceae, Lycopodiaceae, Selaginellaceae,* and *Psilotaceae.*

SPERMATOPHYTA

A. MONOCOTYLEDONS

HYDROCHARITACEAE

HYDRILLA Richard

HYDRILLA VERTICILLATA (Linn. f.) Royle Ill. (1839) 376.

Serpicula verticillata Linn. f. Suppl. (1881) 416.

AMBOINA, Batoe gadjah, *Rel. Robins. 2000*, November 8, 1913, in fresh water at low altitudes.

Central Europe to Australia.

[6] The Amboina Pteridophyta collected by C. B. Robinson. *Philip. Journ. Sci.* 11 (1916) *Bot.* 101–123, *t. 5, 6.*

GRAMINEAE

POLYTRIAS Hackel

POLYTRIAS DIVERSIFLORA (Steud.) Nash in Torreya 5 (1905) 110.

Andropogon diversiflorus Steud. in Zoll. Syst. Verz. (1854) 58.
Andropogon amaurus Büse in Miq. Pl. Jungh. (1854) 360.
Pollinia praemorsa Nees in Steud. Syn. (1854) 409.
Polytrias amaurea O. Ktze. Rev. Gen. Pl. 1 (1891) 788.
Polytrias praemorsa Hack. in DC. Monog. Phan. 6 (1889) 189.

BALI, *Rel. Robins. 2531*, July 7, 1913.

Malay Archipelago and Singapore; introduced into the Philippines and into the West Indies.

POGONATHERUM Beauvois

POGONATHERUM PANICEUM (Lam.) Hack. in Allg. Bot. Zeitschr. 12 (1906) 178.

Saccharum paniceum Lam. Encycl. 1 (1791) 595, *t. 40, f. l.*
Pogonatherum saccharoideum Beauv. Agrost. (1812) 9, *t. 11, f. 7.*

AMBOINA, Negri lama, *Rel. Robins. 1652*, September 8, 1913, on cliffs near streams, altitude 20 meters.

India to Japan, southward through Malaya.

ANDROPOGON Linnaeus

ANDROPOGON HALEPENSIS (Linn.) Brot. Fl. Lusit. 1 (1804) 89, **var. PROPINQUUS** (Hack.) Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 336.

Andropogon propinquus Kunth Enum. 1 (1833) 502.

AMBOINA, Negri lama, *Rel. Robins. 1642*, September 8, 1913, in fields, altitude about 10 meters, locally known as *tebu tebu.*

Ceylon, the Philippines, and the Moluccas (the variety), the species of wide distribution.

THYSANOLAENA Nees

THYSANOLAENA MAXIMA (Roxb.) O. Ktze. Rev. Gen. Pl. 1 (1891) 794.

Agrostis maxima Roxb. Fl. Ind. 1 (1820) 319.
Thysanolaena agrostis Nees in Edinb. New Phil. Journ. 18 (1835) 180.

AMBOINA, Negri lama, *Rel. Robins. 1644*, September 8, 1913, on cliffs near streams, locally known as *bulu perampuan.*

India through Malaya to New Guinea

PASPALUM Linnaeus

PASPALUM SCROBICULATUM Linn. Mant. 1 (1767) 29.

AMBOINA, Koeda mati, *Rel. Robins. 1651*, on margins of a small pond, September 3, 1913.

Widely distributed in the tropics.

PASPALUM CONJUGATUM Berg. in Act. Helvet. 7 (1772) 129, *t. 8.*

AMBOINA, in a sago swamp near the town of Amboina, *Rel. Robins. 1653*, July 25, 1913.

This species, originating in tropical America, has doubtless been introduced into Amboina since Rumphius's time. Now in most tropical countries.

ISACHNE R. Brown

ISACHNE MILIACEA Roth Nov. Pl. Sp. (1821) 58.

AMBOINA, in wet places near the town of Amboina, *Rel. Robins. 1654*, July 25, 1913.

India to Malaya and Polynesia, reported also from South America.

PANICUM Linnaeus

PANICUM PILIPES Nees & Arn. ex Büse in Miq. Pl. Jungh. (1854) 376.

Panicum hermaphroditum Steud. Syn. 1 (1854) 67.

AMBOINA, Hatiwe, *Rel. Robins. 1648*, September 15, 1913.

India to Madagascar, Malaya, tropical Australia, and Polynesia.

PANICUM PATENS Linn. Sp. Pl. (1753) 86.

AMBOINA, Kati-kati, in wet meadows, *Rel. Robins. 1640*, October 19, 1913.

Linnaeus, Mantissa 2 (1771) 232, adds to *Panicum patens* a reference to *Panicum patens* Burm., Fl. Ind. (1768) 26, *t. 10, f. 3*, who in turn cites Rumph. Herb. Amb. 6, *t. 5, f. 3*. *Panicum patens* Burm., however, is a species entirely different from *Panicum patens* Linn.; Rumphius's figure is *Oplismenus compositus* Beauv.

India to southern China, Malaya, and Polynesia.

OPLISMENUS Beauvois

OPLISMENUS BURMANNII (Retz.) Beauv. Agrost. (1812) 54.

Panicum burmannii Retz. Obs. 3 (1783) 10.

AMBOINA, Ayer putri, *Rel. Robins. 1645*, July 29, 1913, in forests.

Tropical Africa and Asia to Japan and Malaya.

PENNISETUM Persoon

PENNISETUM MACROSTACHYUM Trin. in Mém. Acad. St. Pétersb. VI 3^2 (1835) 177.

Saccharum caninum Reinw. in Blume Cat. Gew. Buitenz. (1823) 38, *nomen nudum*.

AMBOINA, Hoenoet, on dry hills, *Rel. Robins. 1643*, October 7, 1913.

Luzon to Java, New Guinea, and Polynesia.

SPOROBOLUS R. Brown

SPOROBOLUS INDICUS (Linn.) R. Br. Prodr. (1810) 170.

Agrostis indica Linn. Sp. Pl. (1753) 63.

AMBOINA, Koesoe koesoe sereh, *Rel. Robins. 1656*, along roadsides.

Tropics of the World.

LEPTASPIS R. Brown

LEPTASPIS URCEOLATA (Roxb.) R. Br. in Benn. Pl. Jav. Rar. (1838–52) 23, *t. 6*.

Pharus urceolatus Roxb. Fl. Ind. ed. 2, 3 (1832) 611.

AMBOINA, Waë, *Rel. Robins. 1655*, November 26, 1913, in thin forests, altitude 10 to 20 meters.

Malay Peninsula and Archipelago, the Philippines, and New Guinea.

GARNOTIA Brongniart

GARNOTIA STRICTA Brongn. Bot. Duperry Voy. (1829) 132, *t. 21.*

AMBOINA, Salahoetoe, *Rel. Robins. 1649*, on rocks and on prostrate logs by streams, altitude 250 meters, November 27, 1913.

India to the Philippines and Malaya, and the Hawaiian Islands.

CHLORIS Swartz

CHLORIS BARBATA Sw. Fl. Ind. Occ. 1 (1797) 200.

AMBOINA, Batoe merah, *Rel. Robins. 1647*, August 5, 1913, along roadsides.

A native of tropical America, probably introduced into Amboina since Rumphius's time; now in all tropical countries.

CENTOTHECA Desvaux

CENTOTHECA LATIFOLIA (Osbeck) Trin. Fund. Agrost. (1820) 141.

Holcus latifolius Osbeck, Dagbok Ostind. Resa (1757) 247.

Cenchrus lappaceus Linn. Sp. Pl. ed. 2 (1763) 1488.

Centotheca lappacea Desv. in Nuov. Bull. Soc. Philomath. 2 (1810) 189.

Centotheca malabarica Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 385, non *Poa malabarica* Linn.

AMBOINA, Negri lama, Soja, and near the town of Amboina, *Rel. Robins. 1646*, July, August, and September, 1913.

Tropical Africa and Asia through Malaya to Australia and Polynesia.

ERAGROSTIS Host

ERAGROSTIS UNIOLOIDES (Retz.) Nees ex Steud. Nom. ed. 2, 2 (1840) 364.

Poa unioloides Retz. Obs. 5 (1789) 19.

Eragrostis amabilis Wight & Arn. in Hook. & Arn. Bot. Beechey Voy. (1841) 251, excl. syn. Linn.

AMBOINA, Koesoe koesoe sereh, *Rel. Robins. 1650*, August 12, 1913, along roads.

Tropical Africa, Asia, and Malaya, introduced into Florida.

BAMBUSA Schreber

BAMBUSA GLAUCESCENS (Willd.) Sieb. ex Munro in Trans. Linn. Soc. 26 (1868) 89, in syn.; Merr. in Philip. Journ. Sci. 7 (1912) Bot. 230.

Ludolphia glaucescens Willd. in Ges. Naturf. Fr. Berl. Mag. 2 (1808) 320.

Bambusa nana Roxb. Hort. Beng. (1814) 25, Fl. Ind. ed. 2, 2 (1832) 199.

AMBOINA, Koeda mati, *Rel. Robins. 1605*, September 3, 1913, introduced and probably cultivated but left to grow naturally. Locally known as *bulu china.*

CYPERACEAE

KYLLINGA Rottboell

KYLLINGA BREVIFOLIA Rottb. Descr. et Ic. Pl. (1773) 13, *t. 4, f. 3.*

AMBOINA, near the town of Amboina, *Rel. Robins. 1897*, July 25, 1913, in a meadow, associated with *Kyllinga monocephala* Rottb.

All warm countries.

PYCREUS Beauvois

PYCREUS NITENS (Vahl) Nees in Linnaea 7 (1834) 283; Nov. Act. Acad. Nat. Cur. 19 (1843) Suppl. 1: 53.

Cyperus nitens Vahl Enum. 2 (1806) 331.

Cyperus pumilus Linn. Cent. Pl. 2 (1755) 6, Amoen. Acad. 4 (1759) 302, non *Pycreus pumilus* Nees.

AMBOINA, Koesoekoesoe sereh, *Rel. Robins. 1891*, August 12, 1913, along roadsides, altitude about 250 meters.

Warmer parts of the Old World.

CYPERUS Linnaeus

CYPERUS COMPRESSUS Linn. Sp. Pl. (1753) 46.

AMBOINA, near the town of Amboina along sandy beaches, *Rel. Robins. 1896*, August 22, 1913.

Tropics of both hemispheres.

CYPERUS HASPAN Linn. Sp. Pl. (1753) 45.

AMBOINA, in meadows, near the town of Amboina, *Rel. Robins. 1898*, August 20, 1913.

Tropics of both hemispheres.

CYPERUS ZOLLINGERI Steud. Syn. Pl. Cyp. (1855) 17.

AMBOINA, Soja road, *Rel. Robins. 1888*, August 1, 1913, altitude 50 meters; along roadsides.

Tropical Africa and Asia to Queensland.

TORULINIUM Desvaux

TORULINIUM FERAX (L. C. Rich.) Ham. Prodr. Pl. Ind. Occ. (1825) 15 (*ferox*).

Cyperus ferax L. C. Rich. in Act. Soc. Hist. Nat. Paris 1 (1792) 106.

Mariscus ferax C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 (1893) 624.

Torulinium confertum Desv. in Ham. Prodr. Pl. Ind. Occ. (1825) 15.

AMBOINA, near the town of Amboina, in wet places, *Rel. Robins. 1893*, August 20, 1913.

All warm countries.

FIMBRISTYLIS Vahl

FIMBRISTYLIS ANNUA (All.) R. & S. Syst. 2 (1817) 95.

Scirpus annuus All. Fl. Pedem. 2 (1785) 277.

Fimbristylis diphylla Vahl Enum. 2 (1806) 289.

Three forms of this polymorphous species occur in the collection from Amboina, Batoe merah, *Rel. Robins. 1902;* Soja road, *Rel. Robins. 1901;* and Koeda mati, *Rel. Robins. 1900*, all collected in August and September.

All warm countries.

FIMBRISTYLIS FUSCA (Nees) Benth. ex C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 (1893) 649.

Abildgaardia fusca Nees in Wight Contrib. (1834) 95.

AMBOINA, Soja road, *Rel. Robins, 1887*, August 1, 1913, on grassy hillsides, altitude about 200 meters.

India to China and Malaya.

FIMBRISTYLIS MILIACEA (Burm.) Vahl Enum. 2 (1806) 287.

Scirpus miliaceus Burm. Fl. Ind. (1768) 22, *t. 9, f. 2.*

AMBOINA, Hoenoet, *Rel. Robins. 1894*, October 18, 1913, in grasslands, altitude about 150 meters.

Hasskarl, Neue Schlüssel (1866) 151, has suggested that *Gramen bufonium* Rumph., Herb. Amb. 6:4, is *Fimbristylis miliacea* Vahl.

Tropics of the World.

SCIRPUS Linnaeus

SCIRPUS ERECTUS Poir. in Lam. Encycl. 6 (1804) 761.

CELEBES, Macassar, *Rel. Robins. 2453*, July 11, 1913.

Widely distributed in both hemispheres.

LIPOCARPHA R. Brown

LIPOCARPHA MICROCEPHALA (R. Br.) Kunth Enum. 2 (1837) 268.

Hypaelyptum microcephalum R. Br. Prodr. (1810) 220.

AMBOINA, Paso and Koesoekoesoe sereh, *Rel. Robins. 1890*, August and September, 1913, roadsides.

Malay Peninsula to Australia.

RYNCHOSPORA Vahl

RYNCHOSPORA RUBRA (Lour.) Makino in Bot. Mag. Tokyo 17 (1903) 180.

Schoenus ruber Lour. Fl. Cochinch. (1790) 41.

Rynchospora wallichiana Kunth Enum. 2 (1837) 289.

AMBOINA, Soja road, *Rel. Robins. 1899*, August 1, 1913, on grassy hillsides, altitude about 100 meters.

Tropical Africa and Asia to Japan, southward through Malaya to Australia.

BAUMEA Gaudichaud

BAUMEA GLOMERATA Gaudich. in Freyc. Voy. Bot. (1826) 416, *t. 29.*

Cladium globiceps C. B. Clarke in Kew Bull. Add. Ser. 8 (1908) 46.

AMBOINA, Amahoesoe, *Rel. Robins, 1895*, on steep banks, altitude about 80 meters.

I am not sure that the identification of this specimen with *Baumea glomerata* Gaudich. is correct, as I have not access to the original description and figure, while the description given by other authors is very short and imperfect. The type, however, was from the Moluccas. The specimen very closely resembles a series of allied forms that have been described as *Baumea deplanchei* Boeckl., of New Caledonia; *Cladium colpoides* Laut., of New Guinea; *Cladium sinuatum* Ridl., of New Guinea; *Cladium juncoides* Elm., of the Philippines; and *Cladium gaudichaudii* W. F. Wight of the Caroline Islands.

VINCENTIA Gaudichaud

VINCENTIA ROBINSONII sp. nov.

Dense caespitosa, glabra, usque ad 1 m alta; foliis equitantibus, coriaceis, glabris, 1 ad 1.5 cm latis, obscure acuminatis; inflorescentiis longe pedunculatis, paniculatis, paniculis circiter 30 cm longis, spiculis omnibus sessilibus, fasciculatis, brunneis, circiter 5 mm longis, filamentis longe exsertis, usque ad 2.5 cm longis.

A densely tufted, perennial, glabrous plant, reaching a height of at least 1 m, the roots stiff, fibrous, the leaves equitant, more or less crowded in the lower 10 cm, up to 90 cm in length, 1 to 1.5 cm wide, straight, coriaceous, smooth, gradually narrowed upward to the obscurely acuminate apex, pale and shining when dry. Inflorescence apparently about as long as the leaves, the peduncle compressed, bearing a few, distant leaves smaller than the basal leaves, the uppermost one bract-like and about 5 cm long. Panicles brown, about 30 cm long, the lower two branches from the axil of the uppermost reduced leaves distant from the others, slender, up to 20 cm in length, somewhat flexuous, perhaps somewhat nodding, the branchlets subtended by a sheathing bract. Spikelets sessile on the ultimate branchlets, usually three in a group, brown, about 5 mm long. Empty glumes two, oblong-ovate to ovate, somewhat keeled, about 3 mm long, rather abruptly and slenderly acuminate. Flowering glumes two, rarely three, 4 to 4.5 mm long. Ovary narrowly ovoid, glabrous, narrowed upward, smooth, 3-angled; style, including the three, slender, 2 mm long arms, 5 mm in length. Stamens 3, the filaments very slender, 2 to 2.5 cm long. Upper two or three glumes empty.

AMBOINA, Salahoetoe, *Rel. Robins. 1892*, November 27, 1913, terrestrial on open hillsides, most abundant at an altitude of about 900 meters.

In aspect this species much resembles *Vincentia malesiaca* Stapf (*Cladium latifolium* Merr.), but it is at once distinguished by its very long and slender filaments, these the most striking character of the present species. For a consideration of the genera *Baumea* and *Vincentia* in relation to *Cladium*, see Stapf in Journ. Linn. Soc. Bot. 42 (1914) 178, 179.

THORACOSTACHYUM Kurz

THORACOSTACHYUM LUCBANENSE (Elm.) Kükenth. in herb. comb. nov.

Mapania lucbanensis Elm. Leafl. Philip. Bot. 2 (1909) 573.

AMBOINA, Hitoe messen, *Rel. Robins. 1889*, October 18, 1913, in forests, altitude about 250 meters.

Previously known only from Luzon. The Amboina specimen has immature spikelets, but agrees in all essential details with our full series

of specimens from Luzon. The leaves are slightly narrower than in the Luzon plant.

DIPLACRUM R. Brown

DIPLACRUM CARICINUM R. Br. Prodr. (1810) 241.

AMBOINA, Kati-kati, *Rel. Robins. 1886*, October 5, 1913, in clearings, altitude about 80 meters.

India to southern China, through Malaya to Queensland.

PALMAE

GRONOPHYLLUM Scheffer

GRONOPHYLLUM MICROCARPUM Scheff. in Ann. Jard. Bot. Buitenz. 1 (1876) 153.

AMBOINA, Waë, *Rel. Robins. 1610, 1611*, in light forests, altitude about 20 meters, locally known as *waylilin*. The specimens were determined by Dr. O. Beccari.

The type of the species was from Ceram Island.

DAEMONOROPS Blume

DAEMONOROPS sp.

AMBOINA, Salahoetoe, *Rel. Robins. 1613, 1612*, November 27, 1913, on rather open slopes, altitude 850 to 900 meters.

Doctor Beccari has reported this as a distinct new species, but no diagnosis of it is at present available for publication.

COMMELINACEAE

ANEILEMA R. Brown

ANEILEMA MALABARICUM (Linn.) Merr. in Philip. Journ. Sci. 7 (1912) Bot. 232.

Tradescantia malabarica Linn. Sp. Pl. ed. 2 (1762) 412.
Commelina nudicaulis Burm. Fl. Ind. (1768) 17, *t. 8, f. l.*
Commelina nudiflorum Linn. Mant. 1 (1767) 177.
Aneilema nudiflorum R. Br. Prodr. (1810) 271.

AMBOINA, Paso, Koeda mati, and Soja, *Rel. Robins. 1829, 1830*, August to November, 1913, in waste places, fallow ground, on clay banks, etc., altitude sea level to 250 meters.

India to southern China and Malaya.

FORRESTIA Lesson

FORRESTIA HISPIDA Lesson & A. Rich. Sert. Astrolab. (1832) 2, *t. 1.*

AMBOINA, Soja and Way tommo, *Rel. Robins. 1831*, August, 1913, on river banks and in forests, altitude 80 to 400 meters.

In various forms from Formosa to Sumatra and New Guinea.

POLLIA Thunberg

POLLIA SORZOGONENSIS (E. Mey.) Steud. Nomen. ed. 2, 2 (1840) 368.

Aclisia sorzogonensis E. Mey. in Presl Rel. Haenk. 1 (1827) 138, *t. 25.*

AMBOINA, Koesoekoesoe sereh, *Rel. Robins. 1828*, August, 23, 1913; Paso, *Rel. Robins. 1827*, September 9, 1913, in meadows at low altitudes.

India to the Philippines, through Malaya to the Moluccas.

LILIACEAE

SMILAX Linnaeus

SMILAX sp. ?

AMBOINA, Hitoe messen, *Rel. Robins. 2008*, October 13, 1913, in forests, altitude about 150 meters.

Possibly a species of *Heterosmilax*, but the flowers are unknown. The species is a very characteristic one, unarmed, with solitary umbels of comparatively large fruits which are blue and fleshy when fresh, globose, about 1.5 cm in diameter when dry, and shining. The prominently reticulate, 5-nerved leaves are 13 to 30 cm long, 5 to 16 cm wide.

IRIDACEAE

BELAMCANDA Adanson

BELAMCANDA CHINENSIS (Linn.) DC. in Red. Lil. (1807) *t. 121.*

Ixia chinensis Linn. Sp. Pl. (1753) 36.
Belamcanda punctata Moench Meth. (1794) 529.

AMBOINA, Liang, *Rel. Robins, 2001*, November 29, 1913, along roadsides at low altitudes.

A native of China, now widely distributed in cultivation; in Amboina apparently an escape from cultivation.

BURMANNIACEAE

BURMANNIA Linnaeus

BURMANNIA LONGIFOLIA Becc. Malesia 1 (1878) 244.

AMBOINA, Salahoetoe, *Rel. Robins. 1849*, November 27, 1913, terrestrial, altitude from 200 to 700 meters and above.

Malay Peninsula (Selangor), Borneo, Mindoro, Negros, Mindanao, Amboina, and New Guinea.

MARANTACEAE

(By TH. VALETON)

PHRYNIUM Willdenow

PHRYNIUM CAPITATUM Willd. Sp. Pl. 1 (1797) 17.

AMBOINA, Way uri, *Rel. Robins. 2035*, September 9, 1913, near streams, altitude about 50 meters, locally known as *pohon rit.*

The specimen is in fruit only, but is possibly referable to this species although Willdenow's species is otherwise not known from the eastern part of the Archipelago. India to southern China, the Philippines, Sumatra, and Java.

B. DICOTYLEDONS

PIPERACEAE

(By C. DECANDOLLE)

PIPER Linnaeus

PIPER GELALAE C. DC. sp. nov.

Ramulis dense villosis; foliis breviter petiolatis, limbo oblongo-ovato basi aequilatera utrinque acuto apice acuminato utrinque

villoso, 5-plinervio nervo centrali nervum utrinque adscendentem opposite ex 5–7 cm supra basin mittente, nervo laterali adscendente utrinque a basi soluto, petiolo villoso basi ima vaginante; pedunculo villoso petiolum superante, spica subflorente quam limbi dimidium breviore tenui, rhachi dense hirsuta, bracteae glabrae pelta rotunda centro pedicellata, staminibus 2, antheris subreniformibus 4-valvatis.

Dioicum, 1.5 m altum. Ramuli spiciferi 1 mm crassi, collenchyma in fasciculos discretos a latere productos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenus nullus. Limbi in sicco membranacei minute et inconspicue pellucido-punctulati, usque ad 12 cm longi et 4 cm lati. Petioli 5 mm, pedunculi 10 mm longi. Spica subflorens 3.3 cm longa, in vivo flava, bracteae pelta 0.5 mm diam.

AMBOINA, Gelala, *Rel. Robins. 1606*, July 16, 1913, in light forests along roadsides, altitude about 5 meters, locally known as *sirioetan* and *siriboea lakilaki*.

PIPER NUDIRAMUM C. DC. sp. nov.

Ramulis glabris; foliis modice petiolatis glabris, limbo rotundato-ovato basi rotundato vel repando-rotundato apice breviter acuminato, nervo centrali nervos arcuatim adscendentes utrinque 4 mittente quorum supremus a 2 cm supra basin solutus et infimus tenuissimus, petiolo fere usque ad limbum vaginante; stirpis fem. pedunculo glabro petiolum fere aequante, spica limbi dimidium paullo superante, bracteae pelta orbiculari centro pedicellata, ovariis arcte condensis ovatis glabris, stigmatibus 3 minutis.

Dioicum, ramuli striolati in sicco flavicantes, spiciferi circiter 2 mm crassi, collenchyma subcontinuum libriforme, fasiciculi intramedullares 1-seriati, canalis lysigenus centralis pluresque peripherici. Limbi in sicco tenuiter membranacei minutissime pellucido-punticulati, circiter 13.5 cm longi et 10.5 cm lati. Petioli fere 2.5 cm longi. Spica florens circiter 3.5 mm crassa, stigmata sessilia. Species P. austrocaledonici proxima, foliorum nervatione ac consistancia ob illo descrepans.

AMBOINA, Itu, *Warburg 17652*, h. reg. Berol.

ULMACEAE

CELTIS Tournefort

CELTIS PANICULATA (Endl.) Planch. in Ann. Sci. Nat. III 10 (1848) 305.

Solenostigma paniculatum Endl. Prodr. Fl. Norfolk. (1833) 42.

AMBOINA, Liang, *Rel. Robins. 1795*, November 29, 1913, altitude about 15 meters, locally known as *wawakar*.

The identification of the Amboina specimen has been made wholly from the description, and is, accordingly not certainly correct. If not *Celtis paniculata* Planch., then it represents a very closely allied form. The cymes, in fruit, are shorter than the petioles, and the leaves are notably dark colored when dry.

Timor laut and New Guinea to Queensland, New Caledonia, and Tahiti.

GIRONNIERA Gaudichaud

GIRONNIERA AMBOINENSIS Lauterb. in Engl. Bot. Jahrb. **50** (1913) 326.

AMBOINA, Hoetoemoeri road, *Rel. Robins. 1794*, September 30, 1913, locally known as *umian utan.*

A species known only from Amboina, considered by Lauterbach to be closely allied to *Gironniera rhamnifolia* Blume. The material I have placed under *G. amboinensis* Lauterb. rather strongly resembles *Gironniera subaequalis* Planch.

TREMA Loureiro

TREMA ORIENTALIS (Linn.) Blume Mus. Bot. Lugd. Bat. **2** (1856) 62.

Celtis orientalis Linn. Sp. Pl. (1753) 1044.

AMBOINA, Amahoesoe, *Rel. Robins. 1763*, August 13, 1913, on limestone hills at an altitude of about 40 meters, locally known as *rufu.*

Himalayan region to Formosa southward to Queensland, with varieties extending to Polynesia and Hawaii.

Doubtless this was included by Rumphius in his general conception of *Cortex piscatorium*, but his description and figure do not apply to this common and well-known form, but to *T. virgata* Blume.

MORACEAE

FATOUA Gaudichaud

FATOUA PILOSA Gaudich. Bot. Freyc. Voy. (1826) 509.

Urtica japonica Thunb. Fl. Jap. (1784) 70, non Linn. f.
Fatoua japonica Blume Mus. Bot. **2** (1861) *t. 38.*

BOETON, *Rel. Robins. 2502*, July 13, 1913.
Eastern Asia, Malaya, and Polynesia.

MALAISIA Blanco

MALAISIA sp.?

AMBOINA, Soja, *Rel. Robins. 1691*, October 24, 1913, in light woods, altitude about 375 meters.

Doctor Robinson describes this as a small tree about 4 m high, but the specimens look as if they were from a scandent shrub. If a *Malaisia*, then the specimens certainly represent an undescribed species. Unfortunately, however, our material presents only matured infructescences, and in the absence of flowers its generic position cannot be determined with certainty. The mature receptacle, when fresh, is yellow, succulent, and the carpels are nearly black.

FICUS Linnaeus

FICUS MYRIOCARPA Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 230.

AMBOINA, Nontetoe, and Negri lama, *Rel. Robins. 1687, 1688,* July and September, 1913, along small streams, at low altitudes, locally known as *tulan babi.*

A most characteristic species, known only from Amboina.

FICUS VILLOSA Blume Bijdr. (1825) 441.

AMBOINA, Way tommo, *Rel. Robins. 1677,* August 17, 1913, climbing on *Ficus* trees, altitude 45 meters, locally known as *tali mera.*

Malay Peninsula and Archipelago to the Philippines.

FICUS CONGESTA Roxb. Fl. Ind. ed. 2, 3 (1832) 560.

AMBOINA, Negri lama, *Rel. Robins. 1690,* in light forests, altitude about 20 meters, locally known as *gohi batu.*

A species manifestly closely allied to the Philippine *Ficus nota* (Blanco) Merr. It was originally described from Amboina specimens cultivated in the botanic garden at Calcutta. King includes it in the doubtful and imperfectly known species.[1] The Amboina specimens agree fairly well with Roxburgh's description and with the figure given by Wight, Ic. *t. 644.*

FICUS AURITA Reinw. ex Blume Bijdr. (1825) 462.

AMBOINA, Halong and Way tommo, *Rel. Robins. 1679, 1689,* August, September, 1913, along river banks, altitude 10 to 40 meters.

A most characteristic species known definitely only from Amboina, but reported from New Guinea, and also from the "Moluccas," although Reinwardt's original specimen probably came from Amboina.

FICUS UROPHYLLA Wall. Cat. (1831) no. 4483.

AMBOINA, Hitoemoeri road, *Rel. Robins. 1683,* September 30, 1913, in light forests, altitude about 150 meters.

The specimen is referable to this widely distributed Indo-Malayan species as it is interpreted by King.

FICUS RETUSA Linn. var. **NITIDA** King in Ann. Bot. Gard. Calcutta 1 (1888) 51.

AMBOINA, near Castle Victoria, town of Amboina, *Rel. Robins. 1678,* September 13, 1913, locally known as *waringin.*

FICUS RIGESCENS Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 278.

AMBOINA, Kati-kati, *Rel. Robins. 1674,* October 7, 1913, in light forests, altitude 80 meters, locally known as *tapialu.*

Ficus rigescens Miq. was described from Amboina material, and has been reduced to *Fiscus ramentacea* Roxb.; however, I consider that it represents a valid species, distinct from the form described by Roxburgh.

FICUS RIGIDA Blume Bijdr. (1825) 465.

Ficus gibbosa Blume Bijdr. (1825) 466.

AMBOINA, Eri, *Rel. Robins. 1686,* September 22, 1913, along the seashore.

The specimen is not quite identical with the Javan form but is probably referable to this species.

[1] Ann. Bot. Gard. Calcutta 1 (1888) 180.

FICUS HENSCHELII sp. nov. § *Eusyce.*

Arbor circiter 8 m alta ramulis junioribus petiolis pedicellisque adpresse villosis; foliis alternis, chartaceis vel submembranaceis, integris, nitidis, usque ad 20 cm longis, oblongo-ovatis ad elliptico-ovatis, prominente acuminatis, basi rotundatis, nervis utrinque 6, subtus prominentibus; receptaculis obovoideis, circiter 1 cm longis, parcissime pubescentibus, pedicellis subaequilongis.

A tree about 8 m high, the young branchlets, petioles, and pedicels appressed-villous with pale-brownish hairs. Branches reddish-brown, terete, glabrous. Leaves alternate, chartaceous or submembranaceous, oblong-ovate to elliptic-ovate, entire, smooth, 18 to 20 cm long, 9 to 10 cm wide, prominently acuminate, the acumen stout, blunt, 1.5 to 2 cm long, base rounded, somewhat 3-nerved, the upper surface somewhat olivaceous, shining, the lower slightly paler, sparingly pubescent on the midrib and lateral nerves; nerves 6 on each side of the midrib, prominent on the lower surface, anastomosing, the primary reticulations lax, distant, subparallel; petioles 3.5 to 5 cm long; stipules lanceolate, acuminate, densely pubescent, about 1 cm long. Receptacles in the axils of fallen leaves, mostly in pairs, obovate, about 1 cm long, apex rounded, base somewhat narrowed, externally smooth and rather pale when dry, very sparingly pubescent with scattered appressed hairs, the pedicels appressed-villous, about as long as the receptacles, the three bracteoles at the apex about 1.5 mm long.

AMBOINA, Hitoe messen, *Rel. Robins. 1684*, October 18, 1913, in forests, altitude about 250 meters.

A species in the group with *Ficus alba* Reinw., apparently most closely allied to the Philippine species *Ficus camiguinensis* Merr. Dedicated to Dr. A. G. E. T. Henschel, author of "Vita G. E. Rumphii, Plinii indici, accedunt specimen materiae Rumphianae medicae clavisque herbarii et thesuarii amboinensis" (1833).

FICUS HASSKARLII sp. nov. § *Eusyce.*

Arbor circiter 6 m alta, species praecedente similis et affinis, differt foliis minoribus, usque ad 12 cm longis, tenuiterque acuminatis, petiolis multo brevioribus, receptaculis globosis.

A tree about 6 m high, the younger branchlets, petioles, and pedicels appressed subferruginous-villous. Branches terete, dark reddish-brown, smooth or somewhat wrinkled when dry. Leaves alternate, chartaceous, pale-olivaceous, oblong to oblong-ovate, 7 to 12 cm long, 3 to 6 cm wide, entire, base rounded or somewhat cordate, apex slenderly and acutely acuminate; lateral nerves 6 to 8 on each side of the midrib, prominent on the

lower surface, anastomosing, the reticulations lax; petioles 1 to 1.5 cm long; stipules lanceolate, acuminate, nearly 1 cm long, densely appressed-pubescent with ferruginous hairs. Receptacles numerous, solitary or in pairs in the axils of fallen leaves, orange when fresh, pale-brownish and smooth when dry, very slightly pubescent with appressed hairs, about 8 mm in diameter, their peduncles about 5 mm long.

AMBOINA, Hoetoemoeri road, *Rel. Robins. 1685*, September 30, 1913, on a fern-covered hillside, altitude about 250 meters.

A species similar, and manifestly closely allied, to *Ficus henschelii* Merr., differing in its much smaller leaves, shorter petioles and pedicels, and globose receptacles. It is dedicated to Dr. J. K. Hasskarl, author of "Neuer Schlüssel zu Rumph's Herbarium amboinense" (1866).

FICUS sp.

AMBOINA, Way tommo and Negri lama, *Rel. Robins. 1675, 1676*, August and September, 1913, along river banks, altitude 20 to 40 meters, locally known as *gondal* and as *gohi ayer*.

A species, perhaps undescribed, allied to the Philippine species *Ficus benguetensis* Merr. and *F. laevicarpa* Elm.

URTICACEAE

CYPHOLOPHUS Weddell

CYPHOLOPHUS MOLUCCANUS (Blume) Miq. Ann. Mus. Bot. Lugd. Bat. 4 (1869) 305.

Urtica moluccana Blume Bijdr. (1825) 491.
Cypholophus macrocephalus Wedd. in Ann. Sci. Nat. Bot. IV 1 (1854) 198.

AMBOINA, Soja and Batoe merah River, *Rel. Robins. 1697*, September and October, 1913, in ravines and along streams, altitude 20 to 250 meters.

Widely distributed in Malaya and Polynesia.

CYPHOLOPHUS COERULEUS (Blume) Wedd. in DC. Prodr. 16[1] (1869) 235[12].

Urtica coerulea Blume Bijdr (1825) 495.

AMBOINA, Hitoe messen, *Rel. Robins. 1909*, October 10, 1913, on forested limestone hills, altitude about 150 meters, the fruits bluish-green when fresh.

A species allied to *Cypholophus lutescens* (Blume) Wedd. It is known only from the Moluccas, and the type was probably from Amboina.

LEUCOSYKE Zollinger and Moritzi

LEUCOSYKE CAPITELLATA (Poir.) Wedd. in DC. Prodr. 16[1] (1869) 235[37].

Urtica capitellata Poir. in Lam. Encycl. Suppl. 4 (1816) 227.

AMBOINA, Soja and Tengah tengah, *Rel. Robins. 1906, 1907*, August and November, 1913, in forests, altitude 25 to 375 meters, locally known as *sasapu utan*.

Formosa to the Moluccas and Java.

FLEURYA Gaudichaud

FLEURYA RUDERALIS (Forst.) Gaudich. Bot. Freyc. Voy. (1826) 497.

Urtica ruderalis Forst. Prodr. (1784) 334.

AMBOINA, Batoe merah, *Rel. Robins. 1908*, July 20, 1913, on coral rocks at low altitudes, locally known as *daun gattal babi*. BOETON, Baoe-baoe, *Rel. Robins. 2491*, July 13, 1913.

Java to the southern Philippines, Marianne, and Society Islands.

PILEA Lindley

PILEA MICROPHYLLA (Linn.) Liebm. Vidensk. Selsk. Skr. 5^2 (1851) 302.

Parietaria microphylla Linn. Syst. ed. 10 (1759) 1308.
Pilea muscosa Lindl. Coll. Bot. (1824) *t. 4*.

AMBOINA, *Rel. Robins. 1911*, on damp stones, town of Amboina, July 19, 1913.

Introduced from tropical America; now in all tropical countries.

PROCRIS Commerson

PROCRIS LAEVIGATA Blume Bijdr. (1825) 508.

Procris philippinensis C. B. Rob. in Philip. Journ. Sci. 5 (1910) Bot. 505.

AMBOINA, Hitoe messen, *Rel. Robins. 1916*, October 10, 1913, on trees and limestone boulders, altitude about 150 meters.

The specimen appears to be typical *Procris laevigata* Blume, rather than **Procris lignescens** (Hallier f.) (*Elatostema lignescens* Hallier f.) which has been credited to Amboina by Hallier f.

India and Ceylon to Malaya and the Philippines.

ELATOSTEMA Forster

ELATOSTEMA MACROPHYLLUM Brongn. Bot. Voy. Coquille (1829) 207, *t. 45*.

AMBOINA, Soja, *Rel. Robins. 1915*, August 2, 1913, in forests, altitude about 400 meters; locally known as *assayu utan*.

The type of the species was from Amboina; it extends from Java to Fiji.

ELATOSTEMA SESQUIFOLIUM (Reinw.) Hassk. Cat. Hort. Bogor. (1844) 79.

Procris sesquifolia Reinw. ex Blume Bijdr. (1825) 511.

AMBOINA, Kati-kati, *Rel. Robins. 1913*, October 17, 1913, near streams, altitude 70 meters.

This species has been reduced by Weddell to *Elatostema integrifolium* (Don) Wedd., of India, but the Malayan specimens appear quite different from Indian material.

Widely distributed in Malaya and the Philippines, perhaps extending to tropical Asia.

ELATOSTEMA ULMIFOLIUM Miq. Pl. Jungh. (1851) 21.

AMBOINA, Hitoe lama, *Rel. Robins. 1910*, October 8, 1913, on limestone rocks, altitude about 150 meters.

Weddell makes this *Elatostema sessile* Forst. var. *ulmifolium* (Miq.)

Wedd. in DC. Prodr. 16[1] (1869) 173. I cannot distinguish the Amboina material from authentically named Javan specimens representing Miquel's species.

ELATOSTEMA sp.

AMBOINA, Salahoetoe, *Rel. Robins. 1912*, on rocks in ravines, altitude 200 meters, November 27, 1913.

A small, slender plant, perhaps undescribed, but the material is rather scanty.

ELATOSTEMATOIDES C. B. Robinson

ELATOSTEMATOIDES POLIONURUM (Hallier f.) comb. nov.

Elatostema polioneurum Hallier f. in Fedde Repert. 2 (1906) 62.

AMBOINA, Hatiwe and Kati-kati, *Rel. Robins. 1814, 1917*, September and October, 1913, along streams, altitude 10 to 70 meters.

Amboina and Celebes; very closely allied to the Philippine *Elatostematoides manillense* C. B. Rob.

PROTEACEAE

HELICIA Loureiro

HELICIA MOLUCCANA (R. Br.) Blume in Ann. Sci. Nat. II 1 (1834) 216.

Rhopala moluccana R. Br. in Trans. Linn. Soc. 10 (1811) 191.

AMBOINA, Hitoe messen, *Rel. Robins. 1657*, October 13, 1913, in forests, altitude about 200 meters.

The type of this species was from Amboina. Its further distribution in the Moluccas is uncertain, as it has been reported only from Amboina.

SANTALACEAE

EXOCARPUS Labillardière

EXOCARPUS AMBOINENSIS sp. nov.

Arbor (vel frutex scandens?) glabra, ramis teretibus, ramulis tenuibus, angulatis; foliis firme chartaceis vel subcoriaceis, oblongis, usque ad 11 cm longis, utrinque subaequaliter angustatis, acutis vel subacutis, basi acutis, 5-nerviis; fructibus axillaribus, solitariis, longe pedicellatis, subglobosis vel late ovoideo-globosis, circiter 6 mm diametro.

A small tree (or a scandent shrub?), quite glabrous. Branches terete, smooth, somewhat reddish-brown, the branchlets slender, paler, somewhat angled. Leaves firmly chartaceous to subcoriaceous, oblong, 5 to 11 cm long, 2 to 4.5 cm wide, dull and rather pale when dry, subequally narrowed to the acute or subacute apex and to the acute base, the basal nerves 5, slender, distinct, often one or two additional nerves leaving the middle one above the base in the larger leaves. Fruits axillary or in the axils of fallen leaves, solitary, purplish-black when fresh, brown when dry, globose or ovoid-globes, about 6 mm in diam-

eter, their pedicels 5 to 7 mm long, with several minute obtuse bracteoles scattered between the base and apex, crowned by the five, usually inflexed, short, acute perianth lobes.

AMBOINA, Hoetoemoeri road, *Rel. Robins. 1810*, September 30, 1913, in forests, altitude about 30 meters, indicated thus: "tree, woody vine, small." The specimen looks as though it came from a scandent plant.

A species well marked by its fruit characters.

HENSLOWIA Blume

HENSLOWIA ROBINSONII sp. nov.

Frutex parisiticus glaber, foliis obovatis ad elliptico-obovatis, coriaceis, in siccitate brunneis, usque ad 9 cm longis, apice rotundatis, basi cuneatis, 5- vel 7-nerviis, distincte petiolatis, petiolo 0.5 ad 1.5 cm longo; fructibus breviter pedicellatis, 7 ad 8 mm longis, oblongis, sursum angustatis, subrostratis, solitariis vel in racemis 2 ad 15 cm longis dispositis.

A parasitic glabrous shrub, the branches terete, brown, the branchlets dark reddish-brown, somewhat angular or compressed. Leaves obovate to elliptic-obovate, 3.5 to 9 cm long, 1.5 to 5 cm wide, coriaceous, dark-brown when dry, dull, apex rounded, base narrowed, cuneate, slenderly 5- or 7-nerved; petioles 0.5 to 1.5 cm long. Fruits shortly pedicelled, rarely solitary, mostly in racemes which vary in length from 2 to 15 cm, the racemes sometimes with a few very greatly reduced leaves, usually leafless, the pedicels 1 to 1.5 mm long, with several minute bracteoles forming a small involucre at the base of the fruit, also with others at the base of the pedicels and usually one or two intermediate ones. Fruits oblong, reddish when fresh, brown when dry, 7 to 8 mm long, narrowed upward and subrostrate, crowned by the five, short, oblong-ovate, acute or subacute perianth lobes.

AMBOINA, Ayer putri, *Rel. Robins. 1809*, July 29, 1913, parasitic on trees at an altitude of about 10 meters, shrubby with a tendency to become scandent.

This species is apparently allied to *Henslowia reinwardtiana* Blume of the Sunda Islands, and to *H. spicata* Blume of Borneo, but is well characterized by its distinctly pedicelled fruits which are usually arranged in racemes, very rarely solitary, the racemes varying in length from 2 to 15 cm.

OPILIACEAE

CHAMPEREIA Griffith

CHAMPEREIA MANILLANA (Blume) Merr. in Philip. Journ. Sci. 7 (1912) 233.

Cansjera manillana Blume Mus. Bot. Lugd. Bat. 1 (1850) 246.
Opilia manillana Baill. Adansonia 3 (1862) 124.
Opilia cumingiana Baill. l. c.

Champereia cumingiana Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 50.
Govantesia malulucban Llanos in Rev. Progr. Cienc. 15 (1865) 191.
Champereia griffithii Kurz For. Fl. Brit. Burma 2 (1877) 330.
Champereia griffithiana Planch. ex Kurz in Journ. As. Soc. Beng. 44[2] (1875) 154.

AMBOINA, Amahoesoe, *Rel. Robins. 1811*, August 30, 1913, in light woods at an altitude of about 2 meters, locally known as *sayor garing*.

The Amboina specimen certainly represents the same species as the common and widely distributed Philippine form. The species is rather variable in vegetative characters, and I have specimens of what I take to be exactly the same form from Formosa and Indo-China. Gamble[1] expresses some doubt as to whether or not the plant that occurs in Burma, the Malay Peninsula, and Sumatra is identical with the Philippine form, and retains the specimens from those regions under the name *Champereia griffithiana* Planch. Philippine material referred to Planchon's species by various authors is certainly *Champereia manillana* (Blume) Merr. The genus, at least, has not previously been reported from the Moluccas.

POLYGONACEAE

POLYGONUM Linnaeus

POLYGONUM BARBATUM Linn. Sp. Pl. (1753) 362, var.

AMBOINA, *Rel. Robins. 1667*, July 25, 1915, in a sago swamp near the town of Amboina.

Widely distributed in the tropics of the Old World.

AMARANTHACEAE

PUPALIA Jussieu

PUPALIA LAPPACEA (Linn.) Juss. in Ann. Mus. Paris 2 (1803) 132.

Achyranthes lappacea Linn. Sp. Pl. (1753) 204.
Achyranthes atropurpurea Lam. Encycl. 1 (1785) 546.
Pupalia atropurpurea Moq. in DC. Prodr. 13[2] (1849) 331.

BOETON, Baoe baoe, *Rel. Robins. 2488*, July 23, 1913.

I do not agree with Moquin in regard to the synonymy of this species, as between the two forms indicated by him as *Pupalia atropurpurea* and *Pupalia lappacea*. I interpret the type of the Linnean species as *Fl. Zeyl. 103*, and Hermann's specimen is *Pupalia atropurpurea* Moq.; see Trimen Fl. Ceyl. 3 (1895) 399.

Widely distributed in tropical Africa, Asia, and Malaya.

NYCTAGINACEAE

PISONIA Plumier

PISONIA CAULIFLORA Scheff. in Nat. Tijdschr. Nederl. Ind. 32 (1871) 417.

AMBOINA, Hitoe lama, *Rel. Robins. 1796*, October 8, 1913, in forest at an altitude of about 150 meters, locally known as *putak putak*.

[1] Journ. As. Soc. Beng. 75[2] (1912) 277.

This species was originally described from specimens collected on Ceram Island, and Bargagli-Petrucci reports it also from New Guinea. It is also cultivated in the botanic garden at Buitenzorg, Java.

PHYTOLOCCACEAE

RIVINIA Linnaeus

RIVINIA HUMILIS Linn. Sp. Pl. (1753) 121 var. **ORIENTALIS** (Moq.) H. Walt. in Engl. Pflanzenreich **39** (1909) 105.

AMBOINA, *Rel. Robins. 1662*, September 25, 1913, in waste places near the town of Amboina.

The variety is widely distributed in the Malayan region; the species, in various forms, in all tropical countries. Undoubtedly an introduced plant in Amboina, as Doctor Robinson queries "cultivated? weed?"

MAGNOLIACEAE

MAGNOLIA Linnaeus

MAGNOLIA COCO (Lour.) DC. Syst. 1 (1818) 459.

Liriodendron coco Lour. Fl. Cochinch. (1790) 347.
Magnolia pumilia Andr. Bot. Repos. *t. 226.*
Talauma pumila Blume Fl. Jav. 3 Schizandr. (1828–36) 38, *t. 12 C.*

AMBOINA, from cultivated specimens in the town of Amboina, *Rel. Robins. 501*, November 23, 1913, locally known as *sampaka salak.*

Probably a native of southern China, but occasional in cultivation in the Philippines and in the Malay Archipelago. *Liriodendron liliifera* Linn. has been cited by many authors as a synonym of this species, but it was based wholly on *Sampacca montana* Rumph., Herb. Amb. 2: 204, *t. 69*, which is *Talauma rumphii* Blume.

SCHIZANDRA Michaux

SCHIZANDRA AXILLARIS (Blume) Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 (1872) 45.

Sphaerostema axillare Blume Fl. Jav. 3 Schizandr. (1828–36) 14, *t. 3.*

AMBOINA, Hatalia, *Rel. Robins. 2005*, October 24, 1913, climbing on trees, altitude about 350 meters.

India, Java, and probably in other islands in the Malay Archipelago.

ANNONACEAE

ANNONA Linnaeus

ANNONA MURICATA Linn. Sp. Pl. (1753) 536.

AMBOINA, Binting, *Rel. Robins. 1782, September* 16, 1913, locally known as *nanka blanda.*

A native of tropical America; now widely distributed in all tropical countries in cultivation.

MYRISTACACEAE

MYRISTICA Linnaeus

MYRISTICA sp.

AMBOINA, Lateri, Way uri, and Hitoe messen, *Rel. Robins. 1877, 2033, 2042*, August to September, 1913, along river banks and in forests, altitude 50 to 300 meters, locally known as *palautan.*

Perhaps an undescribed species, but the specimens present only staminate flowers, and I cannot place it with certainty by the published descriptions alone. It is apparently not one of the forms described by Rumphius.

HORSFIELDIA Willdenow

HORSFIELDIA BIVALVIS (Hook. f.) comb. nov.

Myristica bivalvis Hook. f. Fl. Brit. Ind. 5 (1886) 107.
Myristica globularia Blume Rumphia 1 (1836) 190, non Lam.
Horsfieldia globularia Warb. in Nov. Act. Akad. Naturf. 68 (1897) 288, *t. 21, f. 1–4.*

AMBOINA, Hitoe messen, and Lateri, *Rel. Robins. 1878*, November, 1913, in forests, altitude 75 to 250 meters.

I consider that *Myristica globularia* Blume (1825) is invalidated by *M. globularia* Lam. (1788) and have accordingly adopted Hooker's specific name *bivalvis* for this species.

HORSFIELDIA sp.

AMBOINA, Hitoe messen, *Rel. Robins. 1874*, November 1, 1913, in forested ravines, altitude about 100 meters. The specimen is in fruit, and does not appear to be any of the forms described by Rumphius. I cannot definitely refer it to any described species.

MONIMIACEAE

KIBARA Endlicher

KIBARA MOLUCCANA Perk. in Engl. Bot. Jahrb. 45 (1911) 425.

AMBOINA, Hitoe messen, *Rel. Robins. 1855, 1918*, October 13, 1913, in forests, altitude about 200 meters.

The species is known only from Amboina.

LAURACEAE

PHOEBE Nees

PHOEBE MACROPHYLLA Blume Mus. Bot. Lugd. Bat. 1 (1851) 326.

Persea macrophylla Blume Bijdr. (1825) 568.

AMBOINA, Hitoe messen, *Rel. Robins. 1997*, October 14, 1913, in light forests, altitude 175 meters, locally known as *halaor batu.*

Malay Peninsula, Singapore, Java.

LITSEA Lamarck

LITSEA PERROTTETII (Blume) F.-Vill. Novis. App. (1880) 180.

Tetranthera perrottetii Blume Mus. Bot. 1 (1851) 384.

AMBOINA, Waë, *Rel. Robins. 1996*, November 25, 1913, along roadsides at low altitudes, locally known as *daun titti utan.*

The specimen closely matches *Litsea perrottetii* F.-Vill., which is very common and widely distributed in the Philippines; some of the leaves average slightly larger than in Philippine material, and some of the racemes are longer, but I can detect no essential differences. Previously known from the Philippines, where it extends from northern Luzon to southern Mindanao, and Celebes (*Hose 796*).

LITSEA BANCANA (Miq.) Boerl. Handl. Kenn. Fl. Nederl. Ind. 3 (1900) 143?

Tetranthera bancana Miq. Fl. Ind. Bat. 1[1] (1858) 950.

AMBOINA, Hitoe messen, *Rel. Robins. 1998*, November 1, 1913, borders of clearings, altitude about 200 meters, locally known as *halaor puti*.

The specimen agrees closely with Miquel's description, and with material from a cultivated tree in the botanic garden at Buitenzorg, Java, but may eventually be found to represent an allied but distinct form.

CAPPARIDACEAE

CRATAEVA Linnaeus

CRATAEVA RELIGIOSA Forst. f. Prodr. (1786) 35.

AMBOINA, Way uri, *Rel. Robins. 1905*, September 9, 1913, on river banks, altitude about 90 meters, locally known as *kayu susu*.

India to Malaya and Polynesia.

NEPENTHACEAE

NEPENTHES Linnaeus

NEPENTHES sp.

AMBOINA, Salahoetoe, *Rel. Robins. 1903, 1904*, November 27, 1913, climbing over bushes at from an altitude of 800 meters to the summit, 1,127 meters.

Both of the specimens, manifestly representing the same species, are sterile and are indeterminable except by comparison with authentically named specimens. Possibly they represent an undescribed species. The relatively large pitchers are very characteristic.

(To be concluded.)

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RELIQUIAE ROBINSONIANAE

BY E. D. MERRILL

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

(Concluded.)

SAXIFRAGACEAE

POLYOSMA Blume

POLYOSMA BRACHYANTHA sp. nov.

Arbor usque ad 16 m alta inflorescentiis exceptis glabra; foliis alternis, integris, oblongis, utrinque subaequaliter angustatis, apice prominente acuminatis, basi acutis, usque ad 17 cm longis, nervis utrinque circiter 12, subtus prominentibus; racemis usque ad 14 cm longis, puberulis, multifloris; floribus 4-meris, 1 cm longis, petalis extus minute adpresse puberulis, intus prominente pilosis.

A tree attaining a height of 16 m, entirely glabrous except the inflorescence. Branches and branchlets terete, grayish or brownish. Leaves alternate, firmly chartaceous, olivaceous and somewhat shining when dry, in general oblong, 10 to 17 cm long, 2.5 to 5.5 cm wide, entire, subequally narrowed to the acute base and to the prominently acuminate apex, the acumen usually rather slender, often minutely apiculate; lateral nerves about 12 on each side of the midrib, prominent, anastomosing, the reticulations lax; petioles 1 to 2 cm long. Racemes terminal, solitary, many flowered, up to 14 cm in length, minutely but not densely puberulent with short, appressed, rather pale hairs. Flowers white, 4-merous, 1 cm long, their pedicels puberulent, 1 to 2 mm long, the subtending bracts very small, oblong-ovate, less than 1 mm long. Calyx-tube appressed-puberulent, about 2 mm long, the teeth 4, broadly triangular-ovate, acute, short. Petals 8 mm long, about 1.4 mm wide, obtuse, externally minutely and sparingly ap-

pressed-puberulent, internally prominently pilose. Filaments pilose. Style glabrous. Fruits black when dry, subellipsoid, glabrous, usually apiculate, 7 to 9 mm long.

AMBOINA, Hitoe messen, *Rel. Robins. 1814, 1815, 1816* (type), October and November, 1913, in forests at an altitude of about 200 meters; Gelala, *Rel. Robins. 1812*, September 19, 1913, altitude about 100 meters; Waë, *Rel. Robins. 1813*, in light forest at an altitude of about 20 meters, locally known as *kayumuka*.

The species is well characterized by its unusually short flowers and is possibly most closely allied to *Polyosma stenosiphon* Schltr. of New Guinea. It differs from that species, however, in very many characters, and while apparently common in Amboina, it does not seem previously to have been described.

PITTOSPORACEAE

PITTOSPORUM Banks

PITTOSPORUM RAMIFLORUM Zoll. ex Miq. Fl. Ind. Bat. 1 [2] (1858) 122.

Glyaspermum ramiflorum Zoll. & Mor. Nat. Genees. Neerl. Ind. 2 (1845) 11.

AMBOINA, Hoenoet, *Rel. Robins. 1663*, October 8, 1913, on limestone formations in light woods, altitude about 175 meters.

The specimen agrees perfectly with material from trees cultivated in the botanic garden at Buitenzorg, labelled as having originated in Amboina.

LEGUMINOSAE

SERIANTHES Bentham

SERIANTHES GRANDIFLORA (Wall.) Benth. in Hook. Lond. Journ. Bot. 3 (1844) 225.

Inga grandiflora Wall. Cat. (1832) No. 5285.

AMBOINA, Hatiwe, *Rel. Robins. 2045*, September 15, 1913, in ravines, altitude about 200 meters, locally known as *malaha* and *kadaun*.

Malay Peninsula and Archipelago to the Philippines and New Guinea.

ACACIA Willdenow

ACACIA FARNESIANA (Linn.) Willd. Sp. Pl. 4 (1805) 1083.

Mimosa farnesiana Linn. Sp. Pl. (1753) 521.

AMBOINA, Binting, *Rel. Robins. 2010*, August 13, 1913; cultivated? Locally known as *pohong makassar*.

A native of tropical America, now widely distributed in all hot countries, cultivated and naturalized.

LEUCAENA Bentham

LEUCAENA GLAUCA (Linn.) Benth. in Hook. Journ. Bot. 4 (1842) 416.

Mimosa glauca Linn. Sp. Pl. (1753) 520.

AMBOINA, Batoe merah, *Rel. Robins. 2016*, August 24, 1913, at low altitudes.

A native of tropical America, now widely distributed in all hot countries.

CROTALARIA Linnaeus

CROTALARIA SALTIANA Andr. Bot. Rep. (1811) *t. 648.*

Crotalaria striata DC. Prodr. 2 (1825) 131.

AMBOINA, Batoe merah, *Rel. Robins. 2011*, July 20, 1913, in rocky soil at low altitudes. BALI, Boeleleng, *Rel. Robins. 2533*, July 7, 1913.

All tropical countries; where native uncertain, but probably tropical America.

INDIGOFERA Linnaeus

INDIGOFERA TRIFOLIATA Linn. Amoen. Acad. 4 (1759) 327.

AMBOINA, Soeli, *Rel. Robins. 2017*, November 25, 1913, in grass lands, altitude about 25 meters.

India and Ceylon to southern China, southward through Malaya to tropical Australia.

DESMODIUM Desvaux

DESMODIUM HETEROCARPUM (Linn.) DC. Prodr. 2 (1825) 337.

Hedysarum heterocarpon Linn. Sp. Pl. (1753) 747.
Desmodium polycarpum DC. Prodr. 2 (1825) 334.

AMBOINA, Soja road, *Rel. Robins. 2014*, August 1, 1913, on grassy hillsides, altitude 100 to 300 meters.

Tropical Asia and Africa through Malaya to tropical Australia and Polynesia.

DESMODIUM TRIFLORUM (Linn.) DC. Prodr. 2 (1825) 334.

Hedysarum triflorum Linn. Sp. Pl. (1753) 749.

AMBOINA, town of Amboina, *Rel. Robins. 2015*, July 30, 1913. BOETON, Baoe-baoe, *Rel. Robins. 2483*, July 13, 1913.

Tropics of both hemispheres.

ALYSCICARPUS Necker

ALYSCICARPUS NUMMULARIFOLIUS (Linn.) DC. Prodr. 2 (1825) 353.

Hedysaryum nummularifolium Linn. Sp. Pl. (1753) 746 p. p., excl. Fl. Zeyl. 288.

AMBOINA, Batoe merah and Batoe gadjah, *Rel. Robins. 2043*, July and August, 1913, roadsides, altitude sealevel to 150 meters.

Widely distributed in the tropics of the Old World, introduced in the New World.

URARIA Desvaux

URARIA LAGOPODIOIDES (Linn.) Don Prodr. Fl. Nepal. (1825) 324.

Hedysarum lagopodioides Linn. Sp. Pl. (1753) 1198.
Hedysarum lagopoides Burm. f. Fl. Ind. (1768) 168, *t. 53, f. 2.*

AMBOINA, Lateri and Batoe gadjah, *Rel. Robins. 2013*, August, 1913, grassy hillsides and along trails, altitude 100 to 150 meters. CELEBES, Macassar, *Rel. Robins. 2460*, July 11, 1913.

India to southern China southward through Malaya to tropical Australia.

PHYLACIUM Bennett

PHYLACIUM BRACTEOSUM Benn. Pl. Jav. Rar. (1840) 159, *t. 33.*

AMBOINA, Paso, *Rel. Robins. 2018*, July 8, 1913, in thickets at low altitudes.

Malay Peninsula and Archipelago to the Philippines and New Guinea.

DALBERGIA Linnaeus f.

DALBERGIA DENSA Benth. in Hook. Lond. Journ. Bot. 2 (1843) 217.

AMBOINA, Liang, *Rel. Robins. 2040*, November 29, 1913, near the seashore. Amboina, Jobi, Aru Islands, Key Archipelago, and New Guinea.

DALBERGIA FERRUGINEA Roxb. Hort. Beng. (1814) 98, *nomen*, Fl. Ind. ed. 2, 3 (1832) 228.

AMBOINA, Waë, *Rel. Robins. 2041*, November 29, 1913, in thickets at low altitudes.

Borneo, the Philippines, and the Moluccas to New Guinea and the Caroline Islands.

DERRIS Loureiro .

DERRIS ELEGANS (Grah.) Benth. Pl. Jungh. (1852) 252.

Pongamia elegans Grah. in Wall. Cat. (1832) no. 7540.

AMBOINA, Hitoe messen, *Rel. Robins. 2019*, October 10, 1913, in forests, altitudes about 120 meters.

Tenasserim, the Andaman Islands, Malay Peninsula, Sumatra, and the Philippines.

TERAMNUS Swartz

TERAMNUS LABIALIS (Linn. f.) Spreng. Syst. 3 (1826) 235.

Glycine labialis Linn. f. Suppl. (1781) 325.

CELEBES, Macassar, *Rel. Robins. 2451*, July 11, 1913. BOETON, Baoe-baoe, *Rel. Robins. 2486*, July 13, 1913.

Widely distributed in the tropics of both hemispheres.

MUCUNA Adanson

MUCUNA CYANOSPERMA K. Schum. in K. Schum. & Hollr. Fl. Kaiser Wilh. Land (1889) 98.

AMBOINA, Liang, *Rel. Robins. 2049*, November 29, 1913, climbing over trees, altitude about 15 meters, locally known as *garichi bundoc* and *raraweya*.

The Moluccas and New Guinea.

FLEMINGIA Roxburgh

FLEMINGIA STROBILIFERA (Linn.) R. Br. in Ait. Hort. Kew. ed. 2, 4 (1812) 350.

Hedysarum strobiliferum Linn. Sp. Pl. (1753) 764.

AMBOINA, Paso, *Rel. Robins. 2009*, September 8, 1913, in thickets at low altitudes, locally known as *slai-slai*. BALI, Boeleleng, *Rel. Robins. 2523*, July 7, 1913.

India to southern China and Malaya, introduced in Mauritius and in the West Indies.

PHASEOLUS Linnaeus

PHASEOLUS LUNATUS Linn. Sp. Pl. (1753) 724.

AMBOINA, Mahiya, *Rel. Robins. 2046*, August 12, 1913, limestone formations at an altitude of about 300 meters, locally kown as *kakara puti*.

A native of tropical America, now found wild and cultivated in all tropical countries.

LINACEAE

HUGONIA Linnaeus

HUGONIA ROBINSONII sp. nov.

Frutex scandens glaber, ramis teretibus, ramulis plus minusve angulatis; foliis chartaceis, lanceolatis ad oblongo-lanceolatis, usque ad 20 cm longis, utrinque subaequaliter angustatis, apice acute acuminatis, basi acutis, nitidis, margine crenulato-denticulatis, nervis utrinque 14 ad 16, curvatis, anastomosantibus; inflorescentiis terminalibus, paniculatis, multifloris; sepalis glabris, orbiculari-ovatis, rotundatis, circiter 2 mm longis; petalis oblongis, circiter 8 mm longis, apice obtusis, basi angustatis, cuneatis.

A scandent glabrous shrub 2.5 m long or more, entirely glabrous. Branches terete, lenticellate, pale-brownish, the branchlets dark reddish-brown, somewhat angled when dry. Leaves chartaceous, shining, lanceolate to oblong-lanceolate, 11 to 20 cm long, 4 to 5.5 cm wide, those on the inflorescence much smaller, subequally narrowed to the prominently and acutely acuminate apex and to the acute base, margins rather distantly crenulate-denticulate; lateral nerves 14 to 16 on each side of the midrib, curved, anastomosing, rather distinct on the lower surface, the reticulations rather close; petioles about 5 mm long. Inflorescence a terminal, somewhat leafy, many-flowered panicle up to 30 cm in length, the leaves subtending the branches or partial inflorescences much reduced in size, 2 to 7 cm in length, the hooks stout, recurved, attaining a length of at least 5 cm. Flowers numerous, orange-yellow, the bracts acicular, about 5 mm long, the bracteoles similar but much shorter. Sepals orbicular-ovate, rounded, about 2 mm long. Petals oblong, about 8 mm long, 2.5 mm wide, rounded or obtuse at the apex, base narrowed, cuneate. Stamens 10, the free parts of the shorter filaments about 1 mm long, of the longer ones 1.5 mm. Ovary oblong, glabrous, 1.5 mm long; styles 5, about 3 mm in length.

AMBOINA, Gelela, *Rel. Robins. 1783*, September 19, 1913, in rocky soil near small streams, altitude about 60 meters.

A characteristic species apparently most closely allied to *Hugonia pentagyna* (Warb.) K. Schum. of New Guinea, from which it differs radically in its floral characters.

ERYTHROXYLACEAE

ERYTHROXYLUM P. Browne

ERYTHROXYLUM ECARINATUM Burck in Ann. Jard. Bot. Buitenz. 11 (1893) 191, *t. 15.*

AMBOINA, Waë, *Rel. Robins. 1854*, November 26, 1913; Hitoe messen, *Rel.*

Robins. 1885, October 18, 1913, in forests, altitude 20 to 250 meters, locally known as *kahunar*.

Amboina, Celebes, Buru, Ceram, and New Guinea.

RUTACEAE

TRIPHASIA Loureiro

TRIPHASIA TRIFOLIA (Burm. f.) P. Wils. in Torreya 9 (1909) 33.

Limonia trifolia Burm. f. Fl. Ind. (1768) 103.
Limonia trifoliata Linn. Mant. 2 (1771) 237.
Triphasia trifoliata DC. 1 (1824) 536.
Triphasia aurantiola Lour. Fl. Cochinch. (1790) 153.

AMBOINA, near the town of Amboina and at Ayer putri, *Rel. Robins. 1767*, July 29 and 30, 1913, in light woods at low altitudes.

The probabilities are that this species has been introduced into Amboina since Rumphius's time. It is now of very wide distribution in the Indo-Malayan region, but is, I believe, very generally an introduced plant, although now spontaneous, and in some regions even dominant.

SIMARUBACEAE

QUASSIA Linnaeus

QUASSIA AMARA Linn. Sp. Pl. ed. 2 (1762) 553.

AMBOINA, *Rel. Robins. 1765*, from cultivated plants in the town of Amboina, said to have been introduced from Timor. A native of tropical America, now widely cultivated in the tropics.

BURSERACEAE

CANARIUM Linnaeus

CANARIUM sp.

AMBOINA, Waë, *Rel. Robins. 1846*, November 26, 1913, in light forests, altitude about 20 meters, locally known as *nanari laki laki*.

The specimen presents only staminate flowers, and in the absence of pistillate flowers and fruits I am unable to place it in its proper section; it may even prove to be referable to *Santiria*.

MELIACEAE

DYSOXYLUM Blume

DYSOXYLUM RUMPHII sp. nov. § *Eudysoxylum*.

Arbor circiter 15 m alta, inflorescentiis exceptis subglabra; foliis circiter 70 cm longis, foliolis circiter 25, inferioribus alternis, superioribus subopppositis, chartaceis, oblongis, usque ad 17 cm longis, basi inaequilateraliter rotundatis, apice acuminatis, nervis utrinque 18 ad 20, prominentibus, patulis; racemis 8 ad 13 cm longis, fasciculatis, e truncis vel e ramis vetustioribus, multifloris, cum pedicellis calycis petalisque dense pubescentibus; floribus pedicellatis, 4-meris, circiter 1 cm longis et 5 mm diametro, calycis prominente 4-lobatis; petalis 4, liberis vel

subliberis; tubo glabro, cylindraceo; ovario 4-loculare, dense pubescente.

A tree about 15 m high, nearly glabrous except the cauline inflorescence which is uniformly and densely brownish-pubescent with short hairs. Branches glabrous, terete, the ultimate ones nearly 1 cm in diameter, grayish or brownish. Leaves alternate, about 70 cm long, the rachis and petiole minutely puberulent, becoming quite glabrous. Leaflets about 25, the lower ones alternate, the upper subopposite, oblong, chartaceous, olivaceous, smooth, shining, glabrous or the younger ones very obscurely puberulent beneath, 10 to 17 cm long, 3 to 5 cm wide, acuminate, base inequilaterally rounded, sessile or subsessile; lateral nerves 18 to 20 on each side of the midrib, spreading, prominent. Racemes fascicled, several springing from the same tubercle on the larger branches and trunk, 8 to 13 cm long, many flowered. Flowers white, 4-merous, their pedicels pubescent, about 5 mm long. Calyx densely pubescent, broadly ovoid-cup-shaped, 6 to 7 mm long, loose, the lobes ovate, 3 to 3.5 mm long, rounded. Petals 4, free or nearly so, oblong, rounded, 10 to 12 mm long, 4 mm wide, below glabrous, the upper part on the back very densely and uniformly pubescent with short brownish hairs. Staminal-tube cylindric, glabrous, free, 10 to 11 mm long, cleft into 8, small, oblong, 2 mm long lobes, the lobes rounded-truncate and obscurely retuse, the 1 mm long anthers alternate with the lobes. Disk cylindric, glabrous, truncate, 3 mm long, free. Ovary free, densely pubescent, 4-celled, the lower part of the style densely hirsute, the upper part glabrous.

AMBOINA, Lateri, *Rel. Robins. 1994*, September 5, 1913, in forests, altitude about 175 meters, locally known as *daun lansa utan*, and *tauwan*.

A strongly marked species, well characterized by its long leaves, numerous subsessile leaflets, and its cauline, fascicled, simple, many-flowered racemes. It belongs in the group with *Dysoxylum ramiflorum* Miq., *D. caulostachyum* Miq., and allied forms, but is apparently distinct from all described species.

DYSOXYLUM DECANDRUM (Blanco) Merr. in Govt. Lab. Publ. (Philip.) 27 (1905) 39.

Turraea decandra Blanco Fl. Filip. (1837) 347.

Dysoxylum amooroides Miq. in Ann. Mus. Bot. Lugd. Bat. 4 (1868) 16.

AMBOINA, Batoe merah, *Pl. Rumph. Amb. 1989*, August 24, 1913, in ravines, altitude about 150 meters.

The specimen is in fruit, and appears to be the form of this widely distributed species indicated by Koorders & Valeton as var. *pubescens* K. & V. I cannot distinguish the common Philippine form, *Dysoxylum decandrum* (Blanco) Merr., from *D. amooroides* Miq. and have accordingly reduced the latter.

Luzon to Java and New Guinea.

CHISOCHITON Blume

CHISOCHITON sp.

AMBOINA, Hitoe lama, *Rel. Robins, 1995,* October 11, 1913, in forests, altitude about 150 meters.

The specimen presents only immature fruits, and is hence not further determinable except by comparison with authentically named specimens. It appears to have indehiscent fruits and to belong with that group of species placed by C. DeCandolle in the genus *Dasycoleum.*

AGLAIA Loureiro

AGLAIA MULTIFOLIOLA Merr. in Philip. Journ. Sci. 9 (1914) Bot. 534.

AMBOINA, Hitoe messen, *Rel. Robins. 1990,* October 8, 1913, in forests, altitude about 150 meters.

The specimen closely matches the type of the species, which is closely allied to *Aglaia argentea* Blume. The only other localities known for *Aglaia multiflora* are Basilan and southwestern Mindanao, in the Philippines.

AGLAIA MIQUELII nom. nov.

Aglaiopsis glaucescens Miq. Ann. Mus. Bot. Lugd. Bat. 4 (1868) 59, non *Aglaia glaucescens* King.

Hearnia glaucescens C. DC. Monog. Phan. 1 (1878) 631.

AMBOINA, Batoe merah, *Rel. Robins. 1992,* August 24, 1913, in ravines, altitudes about 200 meters; Amahoesoe, *Rel. Robins. 1993,* September 16, 1913, in light forest, altitude about 70 meters.

Reported by Miquel from various parts of the Moluccas and from New Guinea, but the New Guinea specimens have been referred by C. DeCandolle to *Aglaia novoguineensis* C. DC. in Bull. Herb. Boiss. II 3 (1903) 173. The specimens differ slightly from the species, as described, but I still consider them referable here. Miquel's specific name *glaucescens* is invalidated in *Aglaia* by *Aglaia glaucescens* King, hence the new one proposed above.

AGLAIA sp.

AMBOINA, Hitoe lama, *Rel. Robins. 1991,* November 1, 1913, on limestone formations in forests, altitude about 150 meters, locally known as *lolan puti* and *lansa utan.*

The specimen represents a very characteristic species with a greatly reduced inflorescence, but the flowers are too young to warrant further identification of the specimens at this time.

MALPIGHIACEAE

RYSSOPTERIS Blume

RYSSOPTERIS TIMORIENSIS (DC.) Blume ex A. Juss. in Deless. Ic. Sel. 3 (1837) 21.

Banisteria timoriensis DC. Prodr. 1 (1824) 588.

AMBOINA, Hitoe messen, *Rel. Robins. 2007,* November 1, 1913, on trees at an altitude of about 150 meters.

Definitely reported from Java and Timor.

POLYGALACEAE

EPIRIXANTHES Blume

EPIRIXANTHES ELONGATA Blume Cat. (1825) 82.

AMBOINA, Hatiwe, *Rel. Robins. 1666*, September 15, 1913, altitude about 300 meters.

Previously known from the Malay Peninsula, Borneo, Sumatra, and Java. The generic name is variously spelled *Epirhizanthes*, *Epirhizanthus*, *Epirhizanthe*, and finally *Epirrhizanthes*, the last adopted by Penzig, in Ann. Jard. Bot. Buitenz. 17 (1901) 146, as the philologically correct form. The original spelling, as proposed by Blume, is here retained.

SALOMONIA Loureiro

SALOMONIA CANTONIENSIS Lour. Fl. Cochinch. (1790) 14.

AMBOINA, Batoe mera, *Rel. Robins, 1665*, July 18, 1913, in rocky soil, altitude 15 to 25 meters, locally known as *daun alus bunga*.

Widely distributed in tropical Asia and Malaya.

POLYGALA Linnaeus

POLYGALA POLIFOLIA Presl Rel. Haenk. 2 (1835) 101.

Polygala warburgii Chod. ex Warb. in Engl. Bot. Jahrb. 13 (1891) 346.

AMBOINA, Soja road, *Rel. Robins. 152*, August 1, 1913, hillsides, altitude 150 to 250 meters.

Previously known only from the Philippines, Carolines, and New Guinea. The type of Presl's species was from Luzon, not from Brazil as indicated in Index Kewensis, and *Polygala warburgii* Chod. is identical with it.

EUPHORBIACEAE

PHYLLANTHUS Linnaeus

PHYLLANTHUS RETICULATUS Poir. in Lam. Encycl. 5 (1804) 298.

BALI, Boeleleng, *Rel. Robins. 2520*, July 7, 1913.

Tropical Africa, Asia, and Malaya.

PHYLLANTHUS sp.

AMBOINA, Eri, *Rel. Robins. 1704*, August 30, 1913.

An undershrub about 0.3 m high, representing a characteristic, perhaps undescribed species, but unfortunately our material presents only pistillate flowers. It represents a species allied to the Philippine *Phyllanthus lancifolius* Merr. and *P. macgregorii* C. B. Rob., but is distinct from both.

GLOCHIDION Forster

GLOCHIDION BREYNIOIDES C. B. Rob. in Philip. Journ. Sci. 4 (1909) Bot. 95.

AMBOINA, Koesoekoesoe sereh, *Rel. Robins. 1712*, October 3, 1913, in light woods, altitude about 225 meters.

The Amboina specimen differs from the type of the species in its somewhat larger leaves and larger staminate flowers but is apparently a form

of *Glochidion breynioides* C. B. Rob. The species is widely distributed in the Philippines and is also found in Borneo.

GLOCHIDION MOLLE Blume Bijdr. (1825) 586.

AMBOINA, Hitoe lama, *Rel. Robins. 1711*, November 5, 1913, along roadsides, altitude about 50 meters.

Java to southern Mindanao and Celebes.

GLOCHIDION GLABRUM J. J. Sm. in Lorenz Nova Guinea 8 (1910) 224, *t. 53*.

AMBOINA, Soja road, *Rel. Robins. 1713*, on hillsides, altitude about 50 meters.

The specimen is in fruit, and is almost certainly referable to this recently described species.

SAUROPUS Blume

SAUROPUS ALBICANS (Linn.) Merr. in For. Bur. (Philip.) Bull. 1 (1903) 128.

Cluytia androgyna Linn. Mant. 1 (1767) 128.
Sauropus albicans Blume Bijdr. (1825) 596.

AMBOINA, *Rel. Robins. 1701*, July 22, 1913, in thickets and along the river back of the town of Amboina, locally known as *katok*.

India to southern China to Java, Amboina, and the Philippines.

BREYNIA Forster

BREYNIA PUBESCENS sp. nov.

Frutex circiter 1 m altus, ramulis subtus foliis calycibusque uniformiter subdense tomentosis; foliis submembranaceis, in siccitate nigris, usque ad 4.5 cm longis, ovatis ad oblongo-ovatis, basi acutis ad rotundatis, apice acutis, minutissime apiculatis, nervis utrinque 5 vel 6; calycis valde accrescentibus, subcupularis, obscure lobatis, circiter 6 mm diametro.

A shrub about 1 m high, the branches and branchlets terete, the former pale-brownish, glabrous, the latter slender, nearly black when dry, uniformly and rather densely villous. Leaves ovate to oblong-ovate, submembranaceous, 2.5 to 4.5 cm long, 2 to 3 cm wide, the upper surface nearly glabrous and black when dry, the lower much paler, uniformly villous with somewhat grayish, short, somewhat crisped hairs, the base acute to rounded, the apex acute and minutely apiculate; lateral nerves 5 or 6 on each side of the midrib, slender; petioles pubescent, about 2 mm long. Flowers axillary, solitary, very shortly pedicelled. Fruits green, subglobose, glabrous, black when dry, about 5 mm in diameter, almost surrounded by the cup-shaped, accrescent, obscurely lobed, somewhat pubescent calyx, which is about 6 mm in diameter, black when dry, red when fresh.

AMBOINA, Batoe gadjah, *Rel. Robins. 1694*, August 5, 1913, on open hillsides, altitude 50 to 200 meters.

In aspect this species resembles *Breynia cernua* Muell.-Arg., to which it is manifestly allied, from which it is easily distinguished, however, by the prominent indumentum on its branchlets, leaves, and calyces. In its indumentum it approaches *Breynia ovalifolia* J. J. Sm., of New Guinea, but is not closely allied to that species, differing in its much larger, differently shaped, more numerously nerved leaves, and its cup-shaped accrescent calyx.

APOROSA Blume

APOROSA SPHAERIDOPHORA Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 76.

AMBOINA, Hitoe lama and Lateri, *Rel. Robins. 1714, 1715, 1716,* August, September, and October, 1913, in forests, altitude 100 to 200 meters, locally known as *makarlasi* and *simbun api.*

One of the specimens has pistillate flowers, one very young fruits, and one mature or nearly mature fruits. While they are not absolutely identical with the type material of *Aporosa sphaeridophora* Merr. I can detect no constant differences which would warrant me in separating the Amboina form from the Philippine one.

Widely distributed in the Philippines and also known from Java.

ANTIDESMA Burman

ANTIDESMA GHAESEMBILLA Gaertn. Fruct. 1 (1788) 189, *t. 39*, excl. syn.

AMBOINA, Soja road and vicinity of the town of Amboina, *Rel. Robins. 1710,* August and October, 1913, on stony and grassy hillsides, altitude 35 to 200 meters, locally known as *melur utan.*

India through Malaya to tropical Australia.

MALLOTUS Loureiro

MALLOTUS PANICULATUS (Lam.) Muell.-Arg. in Linnaea 34 (1865) 189.

Croton paniculatus Lam. Encycl. 2 (1786) 207.
Mallotus cochinchinensis Lour. F. Cochinch. (1790) 635.

AMBOINA, Hoetoemoeri road, *Rel. Robins. 1723,* September 30, 1913, along roadsides, altitude about 150 meters, locally known as *haleky ewan.*

Burma to southern China and Formosa, southward to tropical Australia.

MALLOTUS COLUMNARIS Warb. in Engl. Bot. Jahrb. 13 (1891) 349.

AMBOINA, Amahoesoe, *Rel. Robins. 1719, 1720,* August, 1913, on coral limestone at low altitudes, locally known as *haleky karang.*

Amboina and the Key and Aru Islands.

HOMONOIA Loureiro

HOMONOIA JAVENSIS (Blume) Muell.-Arg. in Linnaea 34 (1865) 200.

Spathiostemon javense Blume Bijdr. (1825) 622.
Mallotus eglandulosus Elm. Leafl. Philip. Bot. 1 (1898) 313.

AMBOINA, Ayer putri, Mahija, and Halong, *Rel. Robins. 1717, 1718,* July to September, 1913, on coral limestone, river banks, etc.; altitude, sea level to 300 meters, locally known as *pita hatu.*

Luzon to Java and New Guinea.

MACARANGA Thouars

MACARANGA ROBINSONII sp. nov. § *Inermes.*

Arbor glabra circiter 8 m alta; foliis chartaceis, oblongis, integris, usque ad 16 cm longis, acuminatis, basi acutis vel obtusis, in pagina superiore 2-glandulosis, subtus eglandulosis, costa ciliata, nervis utrinque circiter 11, prominentibus, petiolo 2.5 ad 5.5 cm longo; paniculis ♀ axillaribus, tenuibus, ut videtur paucifloris, usque ad 10 cm longis, bracteis minutis, lanceolatis, integris, eglandulosis; fructibus glabris, inermis, globosis, 4 mm diametro, 1-locellatis.

A glabrous tree about 7 m high. Branches and branchlets slender, terete, reddish-brown, glabrous, or the very young parts at the tip somewhat furfuraceous-lepidote. Leaves alternate, oblong, chartaceous, 10 to 16 cm long, entire, penninerved, olivaceous and somewhat shining when dry, the lower surface ciliate on the midrib, otherwise glabrous, apex slenderly acuminate, base acute to blunt, rather prominently 2-glandular on the upper surface near the insertion of the petiole, the lower surface a little paler then the upper, shining, not at all glandular; lateral nerves about 11 on each side of the midrib, slender, prominent, curved-ascending, anastomosing; petioles 2.5 to 5.5 cm long. Pistillate panicles axillary, slender, apparently few-flowered, up to 10 cm long, the bracts lanceolate, acuminate, entire, eglandular, about 1.5 mm long, the pedicels slender, about 5 mm long. Capsules globose, 5 mm in diameter, 1-celled, 1-seeded, dehiscent, glabrous or obscurely glandular.

AMBOINA, Hitoe messen, *Rel. Robins. 1721*, November 5, 1913, in forests, altitude about 125 meters.

A characteristic species apparently belonging in the section *Inermes* Pax & Hoffm., the three species placed here being from the Philippines and New Guinea. Of the three known species it is most closely allied to *Macaranga inermis* Pax & K. Hoffm. of New Guinea, from which it is distinguished by numerous characters, notably its differently shaped, narrower, prominently acuminate leaves, which are not glandular beneath, and its glabrous capsules.

MACARANGA sp.

AMBOINA, Way uri, *Rel. Robins. 1722*, September 9, 1913, on cliffs along rivers, altitude about 40 meters; locally known as *picha piring puti.*

A characteristic species apparently belonging in the same group with, and allied to, *Macaranga leytensis* Merr. Unfortunately the specimen is very immature; the inflorescence is well formed, but not sufficiently developed to determine whether the plant is a pistillate or a staminate one.

ACALYPHA Linnaeus

ACALYPHA WILKESIANA Muell.-Arg. in DC. Prodr. 16 [5] (1866) 817.

Acalypha tricolor Seem. Fl. Vit. (1865–68) 225.

AMBOINA, *Rel. Robins. 1707, 1708,* September, 1913, from cultivated plants, town of Amboina, locally known as *ekor kuching.*

A native of Polynesia, now widely cultivated in many tropical countries.

ACALYPHA INDICA Linn. Sp. Pl. (1753) 1003.

BALI, Boeleleng, *Rel. Robins. 2525,* July 7, 1913.

Widely distributed in the tropics of the Old World.

ALCHORNEA Swartz

ALCHORNEA RUGOSA (Lour.) Muell.-Arg. in Linnaea 34 (1865) 170.

Cladodes rugosa Lour. Fl. Cochinch. (1790) 704.

Alchornea javensis Muell.-Arg. in Linnaea 34 (1865) 170.

AMBOINA, Lateri, *Rel. Robins. 1702,* August 25, 1913, in forests, altitude about 150 meters, locally known as *pita hatu.*

Burma through Malaya and the Philippines to New Guinea.

EXCOECARIA Linnaeus

EXCOECARIA BICOLOR Hassk. Retzia 1 (1855) 158, var. **VIRIDIS** Pax & K. Hoffm. in Engl. Pflanzenreich 52 (1912) 159.

AMBOINA, Hitoe messen, *Rel. Robins. 1703,* October 10, 1913, on forested limestone hills, altitude about 150 meters.

Java to the Moluccas, the form with leaves reddish or purple beneath cultivated for ornamental purposes; the variety *viridis* Pax & K. Hoffm. in Cochin-China.

EUPHORBIA Linnaeus

EUPHORBIA ATOTO Forst. f. Prodr. (1786) 36.

AMBOINA, Paso, *Rel. Robins. 1705,* October 29, 1913, along the seashore.

Tropical sandy seashores, India to southern China through Malaya to tropical Australia and Polynesia.

EUPHORBIA PROSTRATA Ait. Hort. Kew. 2 (1789) 139.

BALI, Boeleleng, *Rel. Robins. 2530,* July 7, 1913.

Widely distributed in the tropics of both hemispheres.

EUPHORBIA THYMIFOLIA Linn. Sp. Pl. (1753) 454.

AMBOINA, Paso, *Rel. Robins. 1706,* October 31, 1913, along streets.

Widely distributed in the tropics of both hemispheres.

ANACARDIACEAE

BUCHANANIA Roxburgh

BUCHANANIA AMBOINENSIS Miq. Ann. Mus. Bot. Lugd. Bat. 4 (1868) 117.

AMBOINA, Negri lama, *Rel. Robins. 1777,* September 8, 1913, on river banks, altitude about 30 meters; Hitoe messen *Rel. Robins. 1776,* October

3, 1913, in forests, altitude about 200 meters, locally known as *hutong utan.*

Known only from Amboina.

HIPPOCRATEACEAE

SALACIA Linnaeus

SALACIA PRINOIDES (Willd.) DC. Prodr. 1 (1824) 571.

Tontelea prinoides Willd. in Ges. Naturf. Fr. Neue Schr. 4 (1803) 184.

AMBOINA, Paso, *Rel. Robins. 2004,* October 31, 1913, climbing over trees on the seashore.

India to the Malay Archipelago and the Philippines. The Amboina specimen, cited above, is apparently this species, at least as currently interpreted.

STACKHOUSIACEAE

STACKHOUSIA Smith

STACKHOUSIA INTERMEDIA F. M. Bailey in Queensl. Agr. Journ. 3: 281, forma **PHILIPPINENSIS** Pamp. in Bull. Herb. Boiss. II 5 (1905) 1150.

AMBOINA, Soja road, *Rel. Robins. 1766,* August 1, 1913, on grassy dry hillsides, altitude about 300 meters.

The discovery of this species in Amboina, a characteristic Australian type, is of some interest. Doctor Robinson had previously collected it in Guimaras Island, Philippines, and wrote regarding the discovery of it in Amboina, that on the first of August he located a region that strongly resembled the place in Guimaras where he had found *Stackhousia* and deliberately commenced a search for the plant, succeeding in finding it in quantity. It is inconspicuous, slender, and grows among grasses, which perhaps explains why it has not been discovered more frequently. It is known from northern Luzon and from Guimaras Island in the Philippines, from Yap Island in the Carolines, from Amboina, and from northeastern Australia, with a closely allied or identical form in Sumatra.

SAPINDACEAE

GUIOA Cavanilles

GUIOA sp.

AMBOINA, Gelala, *Rel. Robins. 1602,* September 19, 1913, on rocky hillsides at an altitude of about 125 meters.

This is indicated by Doctor Radolkofer as an undescribed species, but a diagnosis of it is not at present available.

RHAMNACEAE

ALPHITONIA Reissek

ALPHITONIA ZIZYPHOIDES (Spr.) A. Gray Bot. Wilkes U. S. Explor. Exped. (1854) 278.

Rhamnus zizyphoides Spr. Fl. Hal. Mant. (1807) 37, Syst. 1 (1825) 768.

Alphitonia excelsa Reiss. in Endl. Gen. Pl. (1840) 1098.

Alphitonia moluccana Teysm. & Binn. Cat. Hort. Bogor. (1866) 221.

AMBOINA, Hatiwe, *Rel. Robins. 1773*, September 15, 1915, on hillsides, altitude about 150 meters locally known as *sapar*.

Borneo and the Philippines to northeastern Australia and Polynesia.

ZIZYPHUS Linnaeus

ZIZYPHUS HORSFIELDII Miq. Fl. Ind. Bat. 1[1] (1856) 643 ?

AMBOINA, Hitoe messen, *Rel. Robins. 1774*, November 1, 1913, climbing over trees at an altitude of about 100 meters.

The identification has been made with Miquel's species from the published description alone, the specimens agreeing fairly well with the characters assigned to it by him. The specimen presents only immature fruits, so that the identification cannot be considered certain; Miquel's species has been reported from Sumatra and Java. The Amboina specimen rather closely resembles the Philippine *Zizyphus crebrivenosa* C. B. Rob., but differs in its pubescent fruits and in its much less prominent transverse nerves which are reticulate-interrupted, not straight and continuous as in Robinson's species.

VENTILAGO Gaertner

VENTILAGO FASCICULIFLORA sp. nov.

Frutex scandens, ramulis junioribus floribusque leviter ciliato-hirsutis exceptis glaber; foliis chartaceis, oblongo-ovatis in siccitate pallidis, nitidis, usque ad 11 cm longis, acuminatis, distanter glanduloso-denticulatis, nervis utrinque circiter 5; floribus fasciculatis, axillaribus, pedicellatis, pedicellis calycibusque ciliato-hirsutis, petalis latissime obovatis, late retusis, lobis patulis, rotundatis.

A scandent shrub, the young branchlets, pedicels, and calyces more or less ciliate-hirsute, the hairs on the branchlets subappressed, those on the pedicels and calyces spreading. Branches very slender, terete, smooth, dark reddish-brown, the younger ones greenish. Leaves oblong-ovate, chartaceous, pale and shining when dry, 7 to 11 cm long, 3.5 to 5 cm wide, apex rather prominently acuminate, the acumen rather broad, apiculate, base subacute to somewhat rounded, somewhat inequilateral, margins distantly and minutely glandular-denticulate; lateral nerves about 5 on each side of the midrib, slender, curved-ascending, distinct, the reticulations close, fine; petioles 3 to 4 mm long, glabrous. Flowers yellowish-green, about 3 mm in diameter, all in axillary fascicles, 8 to 12 flowers in a fascicle, their rather prominently ciliate-hirsute pedicels 3 to 4 mm in length. Calyx-segments triangular-ovate, acute, 1.5 mm long, externally ciliate-hirsute with scattered hairs. Petals glabrous, broadly obovate, base narrowed, apex broadly retuse, the lobes spreading, rounded, the petals wider at the apex than long. Stamens glabrous, about 1.3 mm long. Ovary glabrous; styles 2, short. Fruit not seen.

AMBOINA, Paso, *Rel. Robins. 1818*, October 31, 1913, in thickets near the beach.

A species well characterized by its axillary fascicled flowers, the fascicles constantly solitary, never arranged in racemes as in most of the other species of the genus.

VITACEAE

LEEA Royen

LEEA sp.

AMBOINA, Hitoe lama, Mahija, and Hitoe messen, *Rel. Robins. 1879, 2044*, August and November, 1913, on forested limestone hills, altitude 150 to 225 meters, locally known as *tatahel ayer* and *tatahel ayoo*.

A robust species, 6 to 8 m high, with large compound leaves and ample leaflets, the larger leaflets up to 30 cm in length. It closely resembles the Philippine *Leea negrosensis* Elm., but further identification of the specimens is not possible except by comparison with authentically named specimens, as they are in fruit only.

TILIACEAE

GREWIA Linnaeus

GREWIA ACUMINATA Juss. in Ann. Mus. Paris 4 (1805) 91, *t. 48, f. 2.*

Grewia pedicellata Roxb. Hort. Beng. (1814) 43, *nomen nudum*, Fl. Ind. ed. 2, 2 (1832) 585.

Grewia umbellata Roxb. l. cc. 42, 591.

AMBOINA, Eri, *Rel. Robins. 1807*, September 22, 1913, in thickets near the strand.

This is a topotype of *Grewia pedicellata* Roxb., and agrees with the short original description of that species. It also agrees with the original description and figure of the older *Grewia acuminata* Juss., to which Hochreutiner has reduced *Grewia umbellata* Roxb. It is to be noted, however, that King, Journ. As. Soc. Beng 60 [2] (1891) 109, retains *Grewia umbellata* Roxb. as a distinct species, limiting it to the Malay Peninsula (it was originally described from Sumatran material), and does not consider it to be identical with the Amboinese *Grewia pedicellata* Roxb. Abundant material available here from various parts of the Malay Archipelago and the Philippines leads me to suspect that *Grewia acuminata*, *G. pedicellata* Roxb., and *G. umbellata* Roxb. are all forms of the same species.

GREWIA CERAMENSIS Boerl. ex Hochr. Pl. Bogor. Exsicc. (1904) 30.

AMBOINA, Waë, *Rel. Robins. 1805*, in light forests, altitude about 20 meters; locally known as *sokolat utan*, that is, wild chocolate.

Previously known only from Ceram, and from specimens cultivated in the botanic garden at Buitenzorg, Java.

TRICHOSPERMUM Blume

TRICHOSPERMUM QUADRIVALVE sp. nov.

Arbor parva, ramulis petiolisque dense ferrugineo stellato-pubescentibus; foliis subcoriaceis, oblongo-ovatis, usque ad 24 cm longis, supra parce, subtus densissime pallide stellato-pubescentibus, acuminatis, basi profunde cordatis, aequilateralibus vel

leviter inaequilateralibus, nervis utrinque 7 vel 8, prominentibus, margine serrato-crenulatis; inflorescentiis axillaribus, subcorymbosis, circiter 8 cm longis; floribus 5-meris; fructibus circiter 8 mm longis, obovoideis, 4-angulatis, 4-valvis, extus dense ciliatis.

A small tree about 7 m high, the branches, branchlets, lower surface of the leaves, and the inflorescence prominently and for the most part densely stellate-pubescent. Branches terete, densely puberulent, the indumentum on the ultimate branchlets and petioles ferruginous. Leaves subcoriaceous, oblong-ovate, equilateral or slightly inequilateral at the base, 16 to 24 cm long, 6 to 12 cm wide, the upper surface rather dark-olivaceous when dry, densely stellate-pubescent with pale hairs on the midrib and nerves and with short scattered hairs on the reticulations and surface, the lower surface densely and uniformly stellate-pubescent with short hairs, the lower surface pale-gray in color, base prominently cordate, the lobes broad, rounded, sinus rather narrow, apex acuminate, margins rather closely serrate-crenulate; lateral nerves 7 or 8 on each side of the midrib, prominent, the primary reticulations subparallel, prominent, the base with two pairs of nerves, the lower and outer pair much shorter than the inner ones; petioles 1.5 to 2 cm long. Inflorescence axillary, solitary, in fruit up to 8 cm long, densely stellate-puberulent or pubescent with grayish-olivaceous hairs, paniculate. Flowers 5-merous. Sepals lanceolate, thick, blunt, 5 to 5.5 mm long, outside densely stellate-puberulent with grayish hairs, inside very sparingly pubescent. Petals oblong-spatulate, about 4 mm long, glabrous except at the ciliate base, rounded, membranaceous. Capsules obovoid, about 8 mm long, 4-angled, 4-valved, 4-celled, apiculate, the valves externally densely ciliate with rather soft, subappressed, shining, rather pale hairs. Seeds ovoid, inequilateral, subacute, about 1.2 mm long, rather densely covered with long, soft, copious, white or pale hairs which are attached near the base and along the inner angles.

AMBOINA, near the town of Amboina, *Rel. Robins. 1808*, in ravines, altitude about 50 meters, October 27, 1913, locally known as *morong puti*.

The alliance of this species is manifestly with the Philippine *Trichospermum trivalve* Merr., from which, however, it differs in many characters, notably in its pale indumentum on the lower surface of the leaves, its equilateral or nearly equilateral leaves, and its 4-valved, 4-celled capsules.

Doctor Robinson has suggested on the field label that it may possibly be *Restiaria nigra* Rumph., Herb. Amb. 3: 188, which I have placed under *Columbia subobovata* Hochr., and there are certain points in Rumphius's description that favor this disposition of *Restiaria nigra*. However, the fruit and especially the seed characters indicated by Rumphius certainly do not apply to *Trichospermum*. Continued field work in Amboina may

throw additional light on the exact status of *Restiaria nigra*, but from the evidence and data at present available it seems best to consider it under *Columbia subobovata* Hochr.

TRIUMFETTA Linnaeus

TRIUMFETTA REPENS (Blume) Merr. & Rolfe in Philip. Journ. Sci. 3 (1908) 111.

Porpa repens Blume Bijdr. (1825) 198.
Triumfetta radicans Boj. in Ann. Sci. Nat. II 20 (1843) 103; Gagnep. in Not. Syst. 1 (1910) 172.
Triumfetta subpalmata Soland. ex Hemsl. in Journ. Bot. 28 (1890) 2, *t. 293, f. l.*

AMBOINA, Hitoe lama, *Rel. Robins. 1806*, November 5, 1913, on sandy beaches.

Madagascar, the Seychelles, Borneo, Java, the Philippines, Keeling Islands, small islands in the Gulf of Siam, and those off the northeastern coast of Australia.

MALVACEAE

HIBISCUS Linnaeus

HIBISCUS VITIFOLIUS Linn. Sp. Pl. (1753) 696.

BOETON, Baoe baoe, *Rel. Robins. 2478*, July 23, 1913.
India and Ceylon to tropical Australia.

HIBISCUS SCHIZOPETALUS Hook. f. in Curt. Bot. Mag. *t. 6524*.

AMBOINA, cultivated, *Rel. Robins. 2006*, August 9, 1913.
A native of tropical Africa, now cultivated in most tropical countries.

SIDA Linnaeus

SIDA JAVENSIS Cav. Diss. 5 (1788) 10, *t. 134, f. 2.*

BOETON, Baoe baoe, *Rel. Robins. 2482*, July 13, 1913. BALI, Boeleleng, *Rel. Robins, 2517*, July 7, 1913.
Widely distributed in the tropics of the Old World.

SIDA CORYLIFOLIA Wall. Cat. (1829) no. 1865.

BOETON, Baoe baoe, *Rel. Robins. 2479*, July 13, 1913.
Burma, Indo-China, the Philippines, Java, and Madura.

SIDA RHOMBIFOLIA Linn. Sp. Pl. (1753) 684.

AMBOINA, Lateri, *Rel. Robins. 1695*, August, 1913, along roadsides. BALI, Boeleleng, *Rel. Robins. 2438*, July 7, 1913.
Tropics of the World.

STERCULIACEAE

MELOCHIA Linnaeus

MELOCHIA CONCATENATA Linn. Sp. Pl. (1753) 675.

Melochia corchorifolia Linn. l. c.

AMBOINA, Batoe gadjah, *Rel Robins. 1764*, August 1, 1913, in open grassy places, altitude about 50 meters.

The Linnean specific name *concatenata* has page priority over *corchorifolia*, the latter, however, being the universally used name for this common

and widely distributed species. *Melochia concatenata* Linn. was primarily based on *Fl. Zeyl. 247*, the actual specimen being identical with *Melochia corchorifolia* Linn.

Common and widely distributed in all tropical countries.

MELOCHIA PYRAMIDATA Linn. Sp. Pl. (1753) 674.

BOETON, Baoe baoe, *Rel. Robins. 2494*, July 13, 1913.

A native of tropical America, now widely distributed in the tropics of both hemispheres.

DILLENIACEAE

SAURAUIA Willdenow

SAURAUIA TRISTYLA DC. in Mém. Soc. Phys. Genév. 1 (1822) 433, *t. 7.*

AMBOINA, Lateri, *Rel. Robins. 1857*, September 5, 1913, in thin forests, altitude about 20 meters; Batoe merah River, *Rel. Robins. 1856*, September 24, 1913, on cliffs near the river, altitude about 50 meters.

Originally described from Amboina and known only from this island.

OCHNACEAE

SCHUURMANSIA Blume

SCHUURMANSIA ELEGANS Blume Mus. Bot. Lugd. Bat. 1 (1850) 177, *f. 32.*

AMBOINA, Hatalai, *Rel. Robins. 2036*, October 24, 1913, in light forest at an altitude of about 325 meters.

The type of the species was from Amboina, and Hallier[*] also reports it from Celebes. Doctor Robinson has suggested on the field label that it may possibly be the plant described by Rumphius as *Ligum muscosum*, Herb. Amb. 3: 203, but Rumphius's description of the inflorescence, flowers, and fruits certainly does not apply to *Schuurmansia*. The genus extends from Luzon to New Guinea, comprising nine species—two in Luzon; two in Amboina, of which one extends to Celebes; one in Ternate and Halmaheira; and four in New Guinea. The Bornean *Schuurmansia angustifolia* Hook. f., has been made the type of a distinct genus, *Schuurmansiella*, by Hallier.

THEACEAE

EURYA Thunberg

EURYA TRICHOCARPA Korth. Verh. Nat. Gesch. Bot. (1839–42) 114, *nomen nudum;* Blume Fl. Ind. Bat. 2 (1856) 115.

AMBOINA, Hatiwe, *Rel. Robins. 1804*, September 15, 1913, in thickets, altitude about 250 meters, locally known as *rumput bulu*.

This species was described from Amboina material, and the specimen cited above agrees closely with the description so far as it is comparable; the flowers are young, and no fruits are present. It closely resembles the polymorphous species known as *Eurya acuminata* DC., and doubtless would be included in that species as interpreted by Dyer in Hook. f. Fl. Brit. Ind. 1 (1874) 285. The short-apiculate sepals are, however, characteristic, while the fruit is described by Blume as somewhat pubescent.

[*] Recuiel Trav. Bot. Néerl. 10 (1913) 346.

EURYA NITIDA Korth. Verh. Nat. Gesch. Bot. (1839–42) 115, *t. 17, f. 1–2.*

AMBOINA, Hitoe messen, *Rel. Robins. 1803*, October 18, 1913, in forests, altitude about 475 meters.

The specimen agrees quite closely with the description and with numerous specimens of what is supposed to be *Eurya nitida* Korth. from the Malay Peninsula and Java, except that the sepals are slightly apiculate. A critical revision of the genus may show that the specimen cited above is really distinct. It has been sunk in *Eurya japonica* Thunb. by some botanists, and by Dyer, in Hook. f. Fl. Brit. Ind. 1 (1874) 284, it is treated as *Eurya japonica* Thunb. var. *nitida* (Korth.) Dyer.

GUTTIFERAE

GARCINIA Linnaeus

GARCINIA sp.

AMBOINA, Hitoe lama, *Rel. Robins. 1781*, November 6, 1913, in forests, altitude about 75 meters, locally known as *mangostan utan.*

The specimen has young flowers and is scarcely in condition for accurate identification. It very strongly resembles *Garcinia dulcis* Kurz, but the branchets and branches are terete, not at all angled, while the leaves have numerous scattered glands on the lower surface distinctly visible to the naked eye. Perhaps an undescribed species.

VIOLACEAE

RINOREA Aublet

RINOREA AMBOINENSIS sp. nov. § *Prothesia.*

Frutex circiter 1.5 m altus, ramulis junioribus inflorescentiisque leviter adpresse pubescentibus exceptis glaber; foliis chartaceis, oblongis ad oblongo-ellipticis, integris, usque ad 33 cm longis, nervis utrinque circiter 16, prominentibus, apice longissime acuminatis, basi leviter inaequilateralibus, acutis ad subrotundatis et leviter decurrento-acuminatis; cymis axillaribus, circiter 2 cm longis, paucifloris, sepalis oblongo-ovatis, circiter 3.5 mm longis, acutis; staminibus inclusis, liberis, appendicis late ovatis; ovario hirsuto.

A shrub about 1.5 m high, glabrous except the slightly pubescent branchlets and the appressed-pubescent inflorescences. Branches terete, brownish, glabrous, the branchlets minutely puberulent. Leaves oblong to oblong-elliptic, entire, chartaceous, shining, pale-olivaceous when dry, up to 33 cm long and 12 cm wide, gradually narrowed above to the long-acuminate apex, the acumen stout, acute or apiculate, base slightly inequilateral, acute to somewhat rounded and more or less decurrent-acuminate; lateral nerves about 16 on each side of the midrib, prominent, the reticulations subparallel, distinct; petioles 1.5 to 2 cm long. Cymes axillary, appressed-pubescent, about 2

cm long, rather few-flowered, the pedicels 3 to 5 mm long. Sepals oblong-ovate, acute, sparingly appressed-pubescent, about 3.5 mm long. Petals oblong, narrowed to the base and to the acute apex, at anthesis about as long as the sepals, slightly accrescent, glabrous, or the exposed median portion of the back slightly appressed-pubescent. Stamens free, about 2 mm long, the filaments very short, the appendages to the connectives brown, broadly ovate, acute or subacute, 1 mm long. Ovary densely pale-hirsute; style slender, glabrous, about 1.7 mm long.

AMBOINA, Hoetoemoeri road, *Rel. Robins. 1669*, September 30, 1913, on forested hillsides, altitude about 250 meters.

A species similar, and manifestly very closely allied, to the Philippine species *Rinorea acuminata* Merr., from which it is distinguished by its puberulent, not villous branchlets; its differently shaped, less pubescent sepals; and acute or subacute, ovate connective-appendages.

FLACOURTIACEAE

FLACOURTIA L' Héritier

FLACOURTIA INERMIS Roxb. Hort. Beng. (1814) 73, *nomen nudum*, Fl. Ind. ed. 2, 3 (1832) 833.

AMBOINA, Ayer putri, and near the town of Amboina, *Rel. Robins. 1726*, July, 1913, with flowers and mature fruits, locally known as *tomi tomi*.

Roxburgh's species was based on specimens cultivated in the botanical garden at Calcutta, originating in the Moluccas, probably, or at least possibly, from Amboina. The specimen cited above agrees with the original description in all respects and with specimens from cultivated plants in the botanical garden at Buitenzorg, Java, one of which came from the Calcutta garden. It somewhat resembles *Flacourtia rukam* Z. & M., but is distinguished by having perfect flowers.

CASEARIA Jaoquin

CASEARIA GLABRA Roxb. Hort. Beng. (1814) 33, *nomen nudum*, Fl. Ind. ed. 2, 2 (1832) 421.

Casearia moluccana Blume Mus. Bot. 1 (1850) 255.

AMBOINA, Amahoesoe, Hitoe lama, and Batoe merah, *Rel. Robins. 1724*, August, 1914, in ravines and thin forests, altitude 10 to 50 meters; Koeda mati, *Rel. Robins. 1700*, September 3, 1913, in light woods, altitude 20 meters, locally known as *belu itam tuni*.

Both *Casearia glabra* Roxb. and *C. moluccana* Blume were described from Amboina material, or at least Roxburgh's material was from the Moluccas, probably from Amboina. It is possible that two distinct species are represented, and if *Casearia moluccana* Blume should prove to be distinct from the very inadequately described *Casearia glabra* Roxb., probably our specimens should go with Blume's name. The species is very closely allied to the Philippine *Casearia fuliginosa* Blanco, which, however, has distinctly pubescent sepals, the Amboina form having quite glabrous sepals.

PASSIFLORACEAE

PASSIFLORA Linnaeus

PASSIFLORA MOLUCCANA Blume Bijdr. (1826) 938, Rumphia 1 (1835) 169, *t. 15.*

AMBOINA Mahija, *Rel. Robins. 1659*, October 3, 1913, climbing over trees at an altitude of about 275 meters; Gelala, *Rel. Robins. 1661*, August 25, 1913, in thickets, altitude about 5 meters.

A species originally described from specimens collected in Ternate, and known from a few localities in the Moluccas.

PASSIFLORA FOETIDA Linn. Sp. Pl. (1753) 959.

AMBOINA, waste places on the beach near Castle Victoria, *Rel. Robins. 1660*, November 13, 1913, locally known as *pepinyo utan babulu.*

A native of tropical America, now introduced and naturalized in many other tropical countries.

BEGONIACEAE

BEGONIA Linnaeus

BEGONIA cf. *B. aptera* Blume Enum. Pl. Jav. (1827) 97.

AMBOINA, Kati-kati, *Rel. Robins. 1778*, October 7, 1913, on limestone rocks at an altitude of about 70 meters.

A coarse erect plant attaining a height of nearly 1 m, the stout stems about 1 cm in diameter when dry. It apparently belongs in the same group with the Philippine *Begonia pseudolateralis* Warb., but the material is inadequate to warrant a more definite determination of it, there being no fruits on the specimens.

BEGONIA sp.

AMBOINA, Koesoekoesoe sereh and Soja, *Rel. Robins. 2543*, August, 1913, terrestrial, rarely on rocks, altitude 200 to 400 meters.

BEGONIA sp.

AMBOINA, cultivated in the town of Amboina, *Rel Robins. 1779*, September 25, 1913, a single imperfect specimen inadequate for further identification.

THYMELAEACEAE

PHALERIA Jack

PHALERIA AMBOINENSIS sp. nov.

Frutex glaber, circiter 4 m altus; foliis firme chartaceis vel subcoriaceis, ellipticis ad late oblongo-ellipticis, petiolatis, usque ad 23 cm longis, obtusis vel brevissime lateque acuminatis, basi acutis, nervis primariis utrinque 12 ad 15; inflorescentiis terminalibus, pedunculatis, capitatis, pedunculis circiter 1 cm longis, fasciculatis; floribus numerosis, circiter 2.5 cm longis, extus glabris, laciniis intus puberulis.

A shrub about 4 m high, glabrous except portions of the inflorescence. Branches terete, stout, smooth, reddish-brown, the

ultimate branchlets similar in appearance but more or less compressed at the nodes. Leaves firmly chartaceous to subcoriaceous, elliptic to broadly elliptic-oblong, 15 to 23 cm long, 7 to 10 cm wide, base acute, apex obtuse to shortly and broadly blunt-acuminate, pale-olivaceous and shining when dry; primary lateral nerves 12 to 15 on each side of the midrib, irregular, distinct, anastomosing, the secondary nerves also rather prominent, reticulations lax; petioles stout, up to 1 cm in length. Inflorescence terminal, of few, fascicled, peduncled, rather many-flowered heads, the peduncles usually two or three at the apex of each branchlet, stout, up to 1 cm in length, each bearing 20 or more sessile flowers, the involucral bracts lanceolate to oblong, somewhat acuminate, 9 to 13 cm long, somewhat puberulent toward the apex. Flowers white, about 2.5 cm long, slender, the tube glabrous, the lobes rather densely puberulent inside. Ovary narrowly ovoid, rather densely appressed-hirsute in the upper part. Fruit broadly ovoid, very slightly compressed, subacute, 2-celled, about 12 mm long and wide, glabrous.

AMBOINA, Paso and Batoe merah River, *Rel. Robins. 1802*, September, 1913, in thickets and along the river, altitude 5 to 60 meters.

The genus *Phaleria* seems to be well developed in the Malay Archipelago, but from the material available for comparison and the published descriptions, I cannot definitely refer this Amboina plant to any previously described species.

LYTHRACEAE

ROTALA Linnaeus

ROTALA INDICA (Willd.) Koehne in Engl. Bot. Jahrb. 1 (1880) 172.

Peplis indica Willd. Sp. Pl. 2 (1799) 244.

CELEBES, Macassar, *Rel. Robins. 2456*, July 11, 1913.

India to China and Japan, the Philippines, Java, and Celebes.

AMMANNIA Linnaeus

AMMANNIA BACCIFERA Linn. Sp. Pl. (1753) 120.

CELEBES, Macassar, *Rel. Robins. 2462*, July 11, 1913. BALI, Boeleleng, *Rel. Robins. 2539*, July 7, 1913.

Tropical Asia and Malaya.

LECYTHIDACEAE

BARRINGTONIA Forster

BARRINGTONIA ACUMINATA Korth. in Nederl. Kruidk. Arch. 1 (1848) 206?

AMBOINA, Hoetoemoeri road, *Rel. Robins. 2012*, September 30, 1913, in forests, altitude about 350 meters.

The specimen presents imperfect flowers and no fruits, so that its identity with Korthal's species is somewhat doubtful. The type of the species was from Borneo, and the Amboina specimen agrees well with the

description so far as the specimen and the description are comparable. The same species, or a very closely allied one, is represented by *Foxworthy 129* from Sarawak, Borneo, and "V A 9" cultivated in the botanic garden at Buitenzorg, Java, from Amboina, under the name *Barringtonia rubra* Blume. It is characterized especially by its spicate inflorescence and long petioles.

RHIZOPHORACEAE

BRUGUIERA Lamarck

BRUGUIERA PARVIFLORA (Roxb.) W. & A. Prodr. (1834) 311.

Rhizophora parviflora Roxb. Fl. Ind. 2 (1824) 416, ed. 2, 2 (1832) 461.

AMBOINA, Ayer putri, *Rel. Robins. 1772*, July 28, 1913, along tidal streams.

Tidal forests, India to the Malay Archipelago. I cannot connect this characteristic and strongly marked species with any form described by Rumphius.

COMBRETACEAE

LUMNITZERA Willdenow

LUMNITZERA LITTOREA (Jack) Voigt Hort. Suburb. Calcut. (1756) 39.

Pyrrhanthus littoreus Jack in Malay Miscel. 2 (1822) 57.
Laguncularia purpurea Gaudich Bot. Freyc. Voy. (1826) 481, *t. 104*.
Lumnitzera pedicellata Presl Rel. Haenk. 2 (1831) 23.
Lumnitzera coccinea W. & A. Prodr. (1834) 316.

AMBOINA, Paso, *Rel. Robins. 1833*, October 31, 1913, along the beach.

Along the seashore, India to tropical Australia and Polynesia.

LUMNITZERA RACEMOSA Willd. in Ges. Natur. Fr. Neue Schr. 4 (1803) 187.

AMBOINA, Paso, *Rel. Robins. 1832*, October 31, 1913, along the beach.

Along the seashore, tropical Africa, Asia, Malaya, Australia, and Polynesia.

MYTACEAE

EUGENIA Linnaeus

EUGENIA MOLUCCANA nom. nov.

Eugenia acuminata Roxb. Hort. Beng. (1814) 37, *nomen nudum*, Fl. Ind. ed. 2, 2 (1832) 492, non Link.
Syzygium acuminatum Miq. Fl. Ind. Bat. 1^1 (1855) 452.

AMBOINA, Hitoe messen, *Rel. Robins. 2047*, October 18, 1913, in forests, altitude about 400 meters.

This species was first described from specimens originating in the Moluccas and cultivated in the botanic garden at Calcutta. It is well figured by Wight, Ic. 2: *t. 607*.

EUGENIA BOERLAGEI sp. nov. § *Jambosa*.

Frutex circiter 3 m altus, glaber, ramis ramulisque rubro-brunneis, tenuis, teretibus, laevis; foliis brevissime petiolatis, chartaceis, subellipticis, usque ad 12 cm longis, utrinque subaequaliter angustatis, basi acutis, apice late obtuse acuminatis,

nervis utrinque circiter 10, tenuis, distinctis, anastomosantibus; inflorescentiis lateralibus terminalibusque, tenuis, 3-floris, circiter 6 cm longis, floribus longissime pedicellatis, calycis circiter 7 mm diametro, basi longe angustatis; petalis glandulosopunctatis, subreniformibus, circiter 6 mm diametro.

An erect entirely glabrous shrub about 3 m high, the branches and branchlets slender, terete, reddish-brown, smooth, the bark on the older branches somewhat flaky. Leaves chartaceous, subelliptic, 7 to 10 cm long, 3 to 6 cm wide, subequally narrowed to the acute base and to the short and obtusely acuminate apex, brownish-olivaceous when dry, somewhat shining, the lower surface minutely and rather densely pustulate or pustulate-punctiulate; lateral nerves about 10 on each side of the midrib, slender, distinct, irregular, nearly straight, anastomosing into a somewhat arcuate marginal nerve about 5 mm from the edge of the leaf, this nerve as prominent as the lateral ones, a secondary, much fainter intramarginal nerve usually present, the reticulations faint; petioles about 1 mm long. Inflorescences 3-flowered, terminating the branchlets and springing from the old branches or trunk, about 6 cm long, the peduncles slender, about 3 cm long, the pedicels and flowers about as long as the peduncles. Flowers white, the calyx about 1.5 cm long, 7 mm in diameter at the throat, narrowly funnel-shaped, narrowed below into a long slender pseudostalk, the lobes 4, reniform, rounded, glandular-punctate, 3 mm long, 6 mm wide, persistent. Petals free, subreniform, glandular-punctate, about 6 mm in diameter. Stamens about 10 mm long.

AMBOINA, Liang, *Rel. Robins. 1872*, November 29, 1913, in thickets at an altitude of about 8 meters, locally known as *jambu karang*.

A species well characterized by its lateral and terminal, slender, 3-flowered inflorescences, its long pedicels, and long, narrowed calyx-tube, which, with the sepals and petals is glandular-punctate. The species is dedicated to the late Doctor J. G. Boerlage who contracted a fever while carrying on a botanical exploration of Amboina in the year 1900, which resulted in his untimely death.

EUGENIA sp. § *Jambosa*.

AMBOINA, Waë, *Rel. Robins. 1871*, November 29, 1913, in light forests, altitude about 20 meters, locally known as *kayu mera karang*.

The specimen presents only very young flowers and is scarcely in condition for further identification except by comparison with authentically named specimens.

EUGENIA sp. § *Jambosa*.

AMBOINA, Way tommo, *Rel. Robins. 1873*, along river banks, altitude about 50 meters, the specimen with detached fruits. Not in condition for further identification.

MELASTOMATACEAE

DISSOCHAETA Blume

DISSOCHAETA ROBINSONII sp. nov. § *Diplostemones.*

Frutex scandens, ramulis inflorescentiisque densissime brunneo-stellato-tomentosis; foliis oblongo-ovatis, acute acuminatis, tenuiter apiculatis, basi late rotundatis, chartaceis, usque ad 10 cm longis, supra glabris, nitidis, subtus brunneo-stellato-tomentosis, basi 5-nerviis; paniculis anguste pyramidatis, circiter 10 cm longis, bracteolis lineari-lanceolatis, circiter 5 mm longis; calycis circiter 11 mm longis, 6 mm diametro, deorsum gradatim angustatis, haud urceolatis, extus densissime brunneo-stellato-tomentosis pilisque paucis simplicibus instructis, lobis 4, obtusis, circiter 1.5 mm longis; petalis circiter 15 mm longis, obovatis, retusis, utrinque glabris.

A scandent shrub, the branchlets and inflorescence very densely covered with a dark-brown stellate indumentum, as are the petioles, and to a less degree the branches and lower surface of the leaves. Branches and branchlets terete. Leaves chartaceous, oblong-ovate, 8 to 10 cm long, 4 to 5 cm wide, apex slenderly acuminate and with a very slender apiculus, base broadly rounded, prominently 5-nerved, the upper surface smooth, shining, glabrous, greenish when dry, the lower brown, the nerves and nervules densely stellate-pubescent, darker than the surface which is supplied with similar scattered hairs; transverse nervules numerous, prominent, straight; petioles about 1 cm long. Panicles terminal, narrowly pyramidal, about 10 cm long, the bracteoles linear-lanceolate, about 5 mm long. Calyx-tube about 11 mm long, 6 mm in diameter at the apex, gradually narrowed below to the cuneate base, the pedicels 3 to 4 mm long, all parts very densely stellate-pubescent with dark-brown hairs, and with few, scattered, much longer, simple hairs intermixed, the lobes 4, very broad, obtuse, about 1.5 mm long. Petals 4, obovate, about 1.5 cm long, 1 cm wide, apex broadly rounded and retuse, base narrowed, acute, glabrous on both surfaces, white, the base and margins lilac. Stamens 8, the longer four with filaments 11 mm in length and anthers about 15 mm long, the latter somewhat S-shaped, linear, acuminate, the appendages filiform, flexuous, about 11 mm long.

AMBOINA, Hitoe messen, *Rel. Robins. 2024*, November 5, 1913, climbing on trees at an altitude of about 100 meters.

The alliance of this species is with *Dissochaeta annulata* Hook. f., from which it differs in numerous characters Among these are the thinner, somewhat smaller leaves; the apparently much denser indumentum; the

calyx-tube with scattered, elongated, simple hairs in addition to the stellate ones; the shorter calyx-teeth; and the entirely glabrous petals. Doctor Robinson states that the short stamens are uniformly yellow or yellowish, and that the longer ones have yellow filaments and basal parts of the anthers, but that the tips of the anthers are pale-lilac.

MEMECYLON Linnaeus

MEMECYLON COSTATUM Miq. Anal. Bot. Ind. 1 (1850) 29, ex descr.

AMBOINA, Gelala, *Rel. Robins. 2020*, September 19, 1913, on rocky stream banks, altitude about 150 meters.

Java, Sumatra, and Borneo.

MEDINILLA Gaudichaud

MEDINILLA sp.

AMBOINA, Salahoetoe, *Rel. Robins. 2022*, November 27, 1913, in forests at the summit of the mountain, altitude 1,020 meters.

The specimen presents immature fruits and no flowers and is scarcely in condition for further determination except by comparison with authentically named specimens.

OSBECKIA Linnaeus

OSBECKIA CHINENSIS Linn. Sp. Pl. (1753) 345.

AMBOINA, Soja road, *Rel. Robins. 2023*, August 1, 1913, common on grassy hillsides, altitude 50 to 300 meters.

India to Japan southward to tropical Australia.

PTERNANDRA Jack

PTERNANDRA CAERULESCENS Jack Malay Misc. 2 (1822) 61, var. **CYANEA** (Blume) Cogn. in DC. Monog. Phan. 7 (1891) 1104.

Ewyckia cyanea Blume in Flora 14 (1831) 525, Rumphia 1 (1835) 24, *t. 8*.

AMBOINA, Mahija and Hoetoemoeri road, *Rel. Robins. 2025*, 2026, August 12 and September 30, 1913, in light forests, altitude 150 to 450 meters.

Tenasserim, Indo-China, and the Malay Peninsula. The type of *Ewyckia cyanea* Blume was from Amboina.

OENOTHERACEAE

JUSSIEUA Linnaeus

JUSSIEUA REPENS Linn. Sp. Pl. (1753) 388.

AMBOINA, *Rel. Robins. 1801*, August 23, 1913, in ditches near the town of Amboina.

Tropics of both hemispheres.

JUSSIEUA LINIFOLIA Vahl Eclog. Amer. 2 (1798) 32.

AMBOINA, *Rel. Robins. 1800*, July 25, 1913, in wet places near the town of Amboina.

Widely distributed in the tropics of both hemispheres, probably a native of tropical America.

UMBELLIFERAE

HYDROCOTYLE Linnaeus

HYDROCOTYLE SIBTHORPOIDES Lam. Encycl. 3 (1789) 153.

Hydrocotyle nitidula A. Rich. in Ann. Sci. Phys. 4 (1820) 200, *t. 63, f. 33.*

Hydrocotyle rotundifolia Roxb. Hort. Beng. (1814) 21, *nomen nudum,* Fl. Ind. ed. 2, 2 (1832) 88.

AMBOINA, Roetoeng, *Rel. Robins. 1793,* September 30, 1913, on earth and stones at low altitudes, locally known as *kaki kuda.*

The specimen is apparently exactly the form described by Roxburgh as *Hydrocotyle rotundifolia* from specimens found in cultivated ground in the botanic garden at Calcutta. I can see no reason, however, why the much older name *Hydrocotyle sibthorpoides* Lam. should not be adopted, as Lamarck's description certainly applies to the same form. His type was from the Isle of France; the species is of very wide distribution in the Indo-Malayan region.

MYRSINACEAE

MAESA Forskål

MAESA ROBINSONII sp. nov.

Frutex scandens novellis parce ferrugineo-lepidotis exceptis glaber, omnibus partibus in siccitate brunneis, ramis teretibus, lenticellatis; foliis subcoriaceis, ellipticis, integris, margine revolutis, usque ad 10 cm longis, apice obtusis ad rotundatis, basi leviter inaequilateralibus, subacutis, nervis utrinque circiter 5, subtus prominentibus, reticulis obscuris; petiolo 2 ad 3 cm longo; inflorescentiis axillaribus, paniculatis, usque ad 9 cm longis, e basi ramosis, ramis paucis, patulis; floribus sessilibus, 5-meris, sepalis petalisque haud lineatis, omnino glabris.

A scandent shrub entirely glabrous, except the very young parts, which are more or less ferruginous-lepidote. All parts brown when dry. Branches and branchlets terete, the former prominently lenticellate. Leaves subcoriaceous, elliptic, entire, shining, the lower surface paler then the upper, 7 to 10 cm long, 3.5 to 5.5 cm wide, apex obtuse to broadly rounded, base acute or subacute, slightly inequilateral, margins revolute; lateral nerves about 5 on each side of the midrib, prominent on the lower surface, the reticulations obscure; petioles 2 to 3 cm long. Panicles axillary, solitary, pyramidal, up to 9 cm in length, branched from the base, the branches rather few, spreading, the lower ones up to 4 cm in length, the upper gradually shorter. Flowers numerous, sessile, 5-merous, pink. Bracteoles two, triangular-ovate, acute, 0.5 mm long. Calyx-lobes ovate, acute, entirely glabrous, not punctate, about 0.7 mm long. Petals united for

about the lower one-fifth, oblong-elliptic, obtuse or rounded, about 1.5 mm long, not punctate. Anthers oblong, about 0.8 mm long, inserted near the base of the corolla. Ovary ovoid, small, the style rather stout; ovules few. Fruit immature, ovoid, 2 mm long.

AMBOINA, Hitoe messen, *Rel. Robins. 1880* (type), November 1, 1913, climbing in trees at an altitude of about 200 meters. Apparently referable here is *Rel. Robins. 1881*, from the same locality, November 5, 1913, the leaves broadly elliptic to obovate-elliptic, 8 to 10 cm long and 5 to 8 cm wide.

A very characteristic species, readily recognizable by its elliptic, entire, obtuse to broadly rounded leaves, its axillary many flowered panicles and sessile flowers. Following Mez's key it falls near *Maesa coriacea* (A. DC.) Mez, but it is totally different from that species, and perhaps should be placed near *Maesa sarasenii* Mez. The ovules are apparently few in number, so that the species is somewhat anomalous in the section *Eumaesa*.

MAESA RUBIGINOSA Blume ex Scheff. Comm. Myrsin. Archip. Ind. (1867) 26.

AMBOINA, Amahoesoe, *Rel. Robins. 1876*, September 16, 1913, hanging over cliffs at an altitude of 40 meters.

Originally described from specimens cultivated in the botanic garden at Buitenzorg, Java, originating in Amboina. The species is well characterized by its few-flowered inflorescences, these sometimes reduced to few-flowered fascicles or the uppermost flowers sometimes solitary.

ARDISIA Swartz

ARDISIA AMBOINENSIS Scheff. Comm. Myrsin. Archip. Ind. (1867) 75.

AMBOINA, Hitoe messen and Hitoe lama, *Rel. Robins. 1883, 1884*, October 11 and 13, 1913, in forests, altitude 125 to 200 meters.

Ardisia amboinensis Scheff. is known only from Amboina. Mez [19] has placed it in the section *Stylardisia*, but judging from our material, in full anthesis, I would place it in the section *Acrardisia*, as the styles are shorter than the petals in bud; Mez does not describe the flowers, having apparently seen only a fruiting specimen. The specimens cited above agree very closely with his description and I am confident that they represent Scheffer's species.

ARDISIA RUMPHII sp. nov. § *Pimelandra*.

Arbor circiter 5 m alta ramulis junioribus inflorescentiisque ferrugineo-pubescentibus exceptis glabra; foliis chartaceis, oblongis, usque ad 37 cm longis, obscure obtuse acuminatis, basi leviter abrupteque decurrento-acuminatis, integris, nitidis, subtus puncticulatis, nervis primariis utrinque circiter 16, subtus prominentibus, curvatis, obscure anastomosantibus; inflorescentiis axillaribus, corymboso-paniculatis, submultifloris, dense

[19] Engl. Pflanzenreich 9 (1902) 110.

ferrugineo-pubescentibus, quam petiolo paullo longioribus; floribus parvis, sepalis leviter connatis; ovario ferrugineo-tomentoso.

A tree about 5 m high, the branchlets and inflorescences, especially the latter, densely ferruginous-pubescent. Branches terete, brown, the branchlets dark-brown, sometimes pubescent, sometimes almost or entirely glabrous. Leaves oblong, chartaceous, entire, pale olivaceous-brownish, shining, 22 to 37 cm long, 8 to 10 cm wide, narrowed upward to the obscurely blunt-acuminate apex, the base rather abruptly decurrent-acuminate, sometimes more or less rounded and then somewhat decurrent, the lower surface prominently puncticulate with numerous small glands; primary lateral nerves about 16 on each side of the midrib, prominent on the lower surface, curved, anastomosing, the intermediate secondary nerves distinct; petioles 1.5 to 2 cm long. Inflorescences axillary, corymoose-paniculate, 3 to 3.5 cm long, densely ferruginous-pubescent, branched from the base, the lower branches up to 2 cm in length, the flowers numerous, subumbellately arranged near the tips of the branchlets, their pedicels stout, 2 to 2.3 mm long, the bracteoles linear, pubescent, 1.5 to 2 mm long. Buds globose, rounded. Sepals oblong-ovate, obtuse, puncticulate, pubescent, margins obscurely ciliate, about 1.5 mm long, free nearly to the base. Corolla about 1.5 mm in diameter in anthesis, the lobes elliptic-ovate, punctate, 2.5 mm long, obtuse. Anthers about 1.8 mm long, apiculate, the connective very obscurely punctate. Ovary globose, ferruginous-pubescent; style glabrous, 1.5 to 2 mm long.

AMBOINA, Waë, *Rel. Robins. 1875*, November 29, 1913, in light forests, altitude about 20 meters.

A species closely allied to *Ardisia ternatensis* Scheff., differing, however, in its longer and relatively narrower leaves, which are more or less decurrent on the petioles, shorter petioles, and somewhat longer inflorescences.

CONANDRIUM Mez

CONANDRIUM RHYNCHOCARPUM (Scheff.) Mez in Engl. Pflanzenreich 9 (1902) 156.

Ardisia rhynchocarpa Scheff. Comm. Myrsin. Archip. Ind. (1867) 68.

AMBOINA, Paso, *Rel. Robins. 1882*, October 29, 1913, along the seashore.

A tree about 4 m high, with red-purple flowers. Mez's description was apparently drawn up from immature specimens. The tips of the racemes bear numerous, short-pedicelled, crowded buds, and the bracteoles are early deciduous. The racemes are axillary, solitary, simple, up to 23 cm in length, and the pedicels of the lower flowers attain a length of about 2 cm. The nearly mature petals are about 6 mm long. The species is known only from Amboina.

PLUMBACINACEAE

PLUMBAGO Linnaeus

PLUMBAGO ZEYLANICA Linn. Sp. Pl. (1753) 151.

BOETON, Baoebaoe, *Rel. Robins. 2492*, July 13, 1913.
Widely distributed in the tropics of the Old World.

SAPOTACEAE

SIDEROXYLON Linnaeus

SIDEROXYLON sp. aff. *attenuatum* A. DC.

AMBOINA, Waë, *Rel. Robins. 1817*, November 26, 1913, along the seashore, locally known as *bunga tanjong*.

This is possibly included in the description of *Lignum eurinum* Rumph. Herb. Amb. 3: 63, *t. 35*, but is not the form figured by Rumphius. In *Lignum eurinum* the leaves are acuminate to acute, but in the specimen cited above they are obovate, the apex broadly rounded. It is probably specifically distinct from *Sideroxylon attenuatum* A. DC., but unfortunately the flowers are very immature.

EBENACEAE

MABA Forster

MABA ROSTRATA sp. nov. § *Rhipidostigma*.

Arbor parva, monoica, usque ad 10 m alta, ramulis junioribus subtus foliis ad costa inflorescentiisque pubescentibus; foliis oblongis, firme chartaceis vel subcoriaceis, nitidis, usque ad 23 cm longis, apice breviter obtuse acuminatis, basi cordatis, nervis utrinque circiter 13, prominentibus; inflorescentiis cymosis, axillaribus et e axillis defoliatis; floribus 3-meris, staminibus 9; ovario 6-loculare; fructibus oblongo-ellipsoideis, utrinque angustatis, apice prominente rostratis, usque ad 4.5 cm longis, extus verruculosis, in siccitate brunneis, sursum leviter adpresse hirsutis.

A small tree attaining a height of 10 m and a diameter of 12 cm. Branches reddish-brown, glabrous, the branchlets rather densely subcinereous-pubescent with short hairs. Leaves oblong, firmly chartaceous to subcoriaceous, 9 to 23 cm long, 4 to 7 cm wide, apex shortly, broadly, and obtusely acuminate, base cordate, rarely merely rounded, the upper surface quite glabrous, dark-brown or somewhat olivaceous-brown when dry, shining, the lower surface a little paler, pubescent on the midrib, often also sparingly pubescent on the nerves; lateral nerves about 13 on each side of the midrib, prominent, anastomosing, the reticulations lax; petioles about 5 mm long, pubescent, ultimately nearly glabrous. Cymes axillary and in the axils of fallen leaves, staminate and pistillate ones on the same plant, or sometimes

apparently on different plants. Staminate cymes densely pubescent, 1 to 2 cm long, peduncled or branched from the base, flowers numerous, but few opening at one time. Pedicels about 1 mm long. Calyx densely pubescent, about 3 mm long, the lobes 3, oblong-ovate, acuminate, 1 to 1.5 mm long, not imbricate. Corolla-tube (in bud) about 7 mm long, rather slender, pubescent, somewhat angled, the lobes, before anthesis, about 6 mm long. Stamens 9, sub 2-seriate, inserted near the base of the tube, the filaments and anthers glabrous, the former 1 to 2 mm long, the latter about 1.5 mm long, slenderly apiculate. Female flowers not seen, the cymes apparently few-flowered, axillary, their peduncles in fruit up to 3 cm in length. Sepals three, persistent, ovate, acute, about 4 mm long. Fruit oblong-ellipsoid, narrowed at both ends, about 4.5 cm long, 2 cm in diameter in the middle, the pericarp brown when dry, verruculose, the apical part sparingly appressed-pubescent, the apex prominently rostrate, the beak stout, less than 1 cm long, 6-celled, 6-seeded. Seeds about 2.5 cm long.

AMBOINA, Hitoe lama, *Rel. Robins. 1853* (type), October 11, 1913, in forest, altitude about 150 meters; Lateri, *Rel. Robins. 1670, 2039*, September 9 and August 25, 1913, in forest, altitude 150 to 200 meters; locally known as *palala daun alas, pala ulan, belu itam*, and *daun gayam*.

A species manifestly closely allied to the Bornean *Maba punctata* Hiern, from which it is distinguished especially by its very differently shaped, prominently rostrate fruits, its longer staminate, and much longer pistillate inflorescences, and other minor characters.

SYMPLOCACEAE

SYMPLOCOS Jacquin

SYMPLOCOS SYRINGOIDES Brand in Engl. Pflanzenreich 6 (1901) 41.

AMBOINA, Soja road, *Rel. Robins. 1927, 1928*, August 1 and 4, 1913, a shrub 3 to 5 m high, on hill sides, altitude 50 to 100 meters; locally known as *kayu loba* and *kayu reha*.

Known only from Amboina, and very closely allied to the widely distributed *Symplocos javanica* (Bl.) Kurz, which is also reported by Brand from Amboina.

OLEACEAE

JASMINUM Linnaeus

JASMINUM ZIPPELIANUM Blume Mus. Bot. 1 (1850) 279.

AMBOINA, Waë, *Rel. Robins. 1797*, November 29, 1913, on trees at an altitude of about 20 meters.

Known only from Amboina.

JASMINUM AMBOINENSE sp. nov.

Frutex scandens, ramulis junioribus inflorescentiisque distincte pubescentibus; foliis oppositis, simplicibus, firme chartaceis vel

subcoriaceis, oblongo-ovatis ad late ovato-lanceolatis, glabris, tenuiter acute acuminatis, basi rotundatis ad subacutis, peninerviis, usque ad 11 cm longis, nervis utrinque circiter 7, petiolo articulato; inflorescentiis terminalibus, paniculatis, multifloris, calycis laciniis 6 ad 8, haud 1 mm longis.

A scandent shrub, the leaves and branches glabrous, the young branchlets and inflorescence, including the calyces, distinctly pubescent with short, rather pale hairs. Branches and branchlets dark reddish-brown when dry, smooth, not lenticellate, terete. Leaves opposite, firmly chartaceous to subcoriaceous, oblong-ovate to broadly ovate-lanceolate, 6 to 11 cm long, 3 to 5 cm wide, dull and brownish-olivaceous when dry, gradually narrowed upward to the slender and sharply acuminate apex, the base rounded to subacute; nerves about 7 on each side of the midrib, distinct, obscurely anastomosing, not impressed, the reticulations lax, obscure; petioles glabrous, 8 to 10 mm long, jointed below the middle. Panicles terminal, pubescent, rather many-flowered, the bracteoles and bracts pubescent, acicular or linear, 1 to 2 mm long, partial inflorescences in the axils of the upper reduced leaves, forming a somewhat leafy inflorescence 8 to 10 cm in length. Calyx-tube somewhat funnel-shaped, 2 to 3 mm long, pubescent, narrowed below to the pedicel, the teeth 6 to 8, short, narrow, pubescent, less than 1 mm long.

AMBOINA, Hitoe messen, *Rel. Robins. 2032*, October 10, 1913, climbing on trees at an altitude of about 150 meters.

This species, apparently not previously described, resembles *Jasminum bifarium* Wall. in general appearance and in its vegetative characters. It is distinguished, however, by its very short calyx teeth.

JASMINUM CELEBICUM sp. nov.

Frutex ut videtur scandens, glaber vel ramulis junioribus minute puberulis; foliis oppositis, simplicibus, firme chartaceis, oblongo-ovatis ad late oblongo-lanceolatis, usque ad 7 cm longis, tenuiter acute acuminatis, basi acutis ad rotundatis, nervis utrinque circiter 7, tenuibus; inflorescentiis terminalibus axillaribusque, paucifloris, pedunculatis, calycis lobis 6 ad 8, linearis, glabris, circiter 6 mm longis, quam tubo triplo longioribus.

A shrub, apparently scandent, quite glabrous except for some of the younger branchlets, which are minutely puberulent. Branches and branchlets slender, terete, brownish or brownish-red. Leaves simple, opposite, firmly chartaceous, brownish-olivaceous or very dark-brown when dry, dull or slightly shining, 4 to 7 cm long, 2 to 3 cm wide, base rounded to subacute, apex slenderly and sharply acuminate; lateral nerves about 7 on each side of the midrib, slender, obscurely anastomosing, the reticu-

lations obsolete or nearly so; petioles 3 to 5 mm long, jointed below the middle. Inflorescence terminal and terminating short lateral branches, or in the axils of the upper leaves, slender, peduncled, few-flowered, usually about three flowers in each inflorescence, the peduncle often supplied with a few, oblong, apiculate, greatly reduced leaves or leaf-like bracts less than 1 cm long, the bracteoles very slender, linear-acicular, 2 to 3 mm long. Calyx-tube glabrous, cup-shaped, about 2 mm long, the teeth 6 to 8, linear, glabrous, persistent, about 6 mm long. Corolla-tube 7 to 8 mm long.

CELEBES, Macassar, *Rel. Robins. 2450*, July 11, 1913.

Perhaps as closely allied to *Jasminum ensatum* Blume as to any other species, but the petioles, peduncles, and calyces quite glabrous; the leaves much smaller; and the calyx-lobes relatively much longer.

LINOCIERA Swartz

LINOCIERA RAMIFLORA (Roxb.) Wall. Cat. (1831) No. 2824.

Chionanthus ramiflora Roxb. Hort. Beng. (1814) 3, *nomen nudum*, Fl. Ind. ed. 2, 1 (1832) 107.

AMBOINA, Liang, *Rel. Robins. 1798*, November 29, 1913, in thickets at an altitude of about 15 meters.

Chionanthus ramiflora Roxb. was described from specimens cultivated in the botanic garden at Calcutta originating in the Moluccas, probably Amboina. The typical form is also cultivated in the botanic garden at Buitenzorg, Java, from specimens originating in Amboina. I have a series of specimens before me from Burma, Indo-China, various parts of Malaya, the Philippines, and tropical Australia, that I unhesitatingly refer to this species. The Philippine forms, *Linociera luzonica* (Blume) F.-Vill., and *L. cumingiana* Vid. must both certainly be reduced to this widely distributed species.

LOGANIACEAE

STRYCHNOS Linnaeus

STRYCHNOS sp.

AMBOINA, Hitoe messen, *Rel. Robins. 2029*, October 13, 1913, in forests, altitude about 200 meters. Indicated by Mr. A. W. Hill as an undescribed species.

FAGRAEA Thunberg

FAGRAEA SPECIOSA Blume Rumphia 2 (1836) 35, *t. 81*.

Cyrtophyllum speciosum Blume Bijdr. (1826) 1022.

Fagraea elliptica Roxb. Hort. Beng. (1814) 84, *nomen nudum*, Fl. Ind. ed. 2, 1 (1832) 462.

AMBOINA, Koesoekoesoe sereh and Mahiya, *Rel. Robins. 2037*, October, 1913, in light forests, altitude 200 to 250 meters, locally known as *tonki tonki*.

Fagraea speciosa Blume is here adopted as the oldest valid specific name for this species, the original use of the name *Fagraea elliptica* Roxb. being as a *nomen nudum*. Miquel, Fl. Ind. Bat. 2 (1857) 376 reduced Blume's

species, which is fully described and excellently figured, to *Fagraea elliptica* Roxb. The Amboina specimens certainly represent Roxburgh's species, which was originally described from Moluccan material, probably from Amboina specimens. The description, which is wholly inadequate, follows: "Leaves opposite, short-petioled, broad-elliptic, smooth, and firm. Corymbs terminal, more than super-decompound. Tube of the corol cylindric. A native of the Moluccas."

Java and Amboina.

BUDDELIA Houstoun

BUDDLEIA ASIATICA Lour. Fl. Cochinch. (1790) 72.

AMBOINA, Koesoekoesoe sereh, *Rel. Robins. 2031*, August 23, 1913.

Widely distributed in the Indo-Malayan region.

MITREOLA Linnaeus

MITREOLA PETIOLATA (Walt.) Torr. & Gray Fl. North. Am. 2 (1846) 45.

Anonymos petiolata Walt. Fl. Carol. (1788) 108.

Ophiorrhiza mitreola Linn. Sp. Pl. (1753) 150.

Mitreola paniculata Wall. Cat. (1829) no. 1826; DC. Prodr. 9 (1845) 9.

Mitreola oldenlandioides Wall. Cat. (1831) no. 4350; DC. Prodr. 9 (1845) 9.

AMBOINA, Silali, *Rel. Robins. 2038*, September 22, 1913, on coral rocks, altitude about 40 meters.

The form is the one designated by Hochreutiner as *Cynoctonum mitreola* (Linn.) Britt. var. *orthocarpa* Hochr. in Bull. N. Y. Bot. Gard. 6 (1910) 284, i. e. strictly *Mitreola oldenlandioides* Wall. The species is exceedingly variable, and is widely distributed in the tropics of both hemispheres.

GENIOSTOMA Forster

GENIOSTOMA sp.

AMBOINA, Hatiwe, *Rel. Robins. 2034*, September 15, 1913, a small tree, about 5 m high, in light forests, altitude about 250 meters, locally known as *kayu tai*.

Probably an undescribed species, but the specimen presents no flowers, only very old fruits. The only species of the genus previously reported from Amboina is *Geniostoma moluccanum* Valeton in Bull. Inst. Bot. Buitenz. 12 (1902) 19, which, from the description, is a species entirely different from the one represented by the specimen cited above.

CONVOLVULACEAE

LEPISTEMON Blume

LEPISTEMON BINECTARIFERUM (Wall.) O. Kuntze Rev. Gen. Pl. 1 (1891) 446.

Convolvulus binectariferus Wall. in Roxb. Fl. Ind. 2 (1820) 47.

Lepistemon flavescens Blume Bijdr. (1825) 722.

AMBOINA, Kati-kati, *Rel. Robins. 1762*, October 5, 1913, in thickets, altitude about 80 meters.

India to the Philippines and Malaya at least as far to the southeast as Amboina.

PORANIA Burmann

PORANIA VOLUBILIS Burm. Fl. Ind. (1768) 51, *t. 21, f. 1.*

AMBOINA, *Rel. Robins. 1821*, September 25, 1913, from specimens cultivated in the town of Amboina; probably an introduced plant here.

Burma to the Philippines and Malaya.

EVOLVULUS Linnaeus

EVOLVULUS ALSINOIDES Linn. Sp. Pl. ed. 2 (1762) 292.

AMBOINA, Soja road, *Rel. Robins. 1820*, in open grassy places, altitude 150 to 300 meters.

Tropics of both hemispheres.

MERREMIA Dennstaedt

MERREMIA VITIFOLIA (Burm.) Hallier f. in Engl. Bot. Jahrb. 16 (1893) 552.

Convolvulus vitifolius Burm. Fl. Ind. (1768) 45, *t. 18, f. 1.*

AMBOINA, Kati-kati, *Rel. Robins. 1826*, October 19, 1913, in thickets at an altitude of about 70 meters.

Southeastern Asia to the Philippines and Malaya.

MERREMIA HASTATA (Desr.) Hallier f. in Engl. Bot. Jahrb. 16 (1893) 552.

Convolvulus hastatus Desr. in Lam. Encycl. 3 (1791) 547.

AMBOINA, Batoe gadjah, *Rel. Robins. 1824*, August 5, 1913, in grassy places at an altitude of 150 meters.

Tropical Africa and Asia through Malaya to tropical Australia.

IPOMOEA Linnaeus

IPOMOEA PANICULATUS (Linn.) R. Br. Prodr. (1810) 486.

Convolvulus paniculatus Linn. Sp. Pl. (1753) 156.
Ipomoea digitata Linn. Syst. ed. 10 (1759) 924.

AMBOINA, Paso, *Rel. Robins. 1823*, November 25, 1913, in thickets along roadsides near sea level.

Tropics of both hemispheres.

IPOMOEA TRILOBA Linn. Sp. Pl. (1753) 161.

AMBOINA, near the town of Amboina along the beach, *Rel. Robins. 1825*, August 22, 1913.

A native of tropical America, introduced into the Philippines at an early date from Mexico and now found throughout the Archipelago; also in the Marianne Islands, Java, Mauritius, Singapore, and perhaps in various other parts of Malaya.

IPOMOEA OBSCURA (Linn.) Ker. in Bot. Reg. *t. 239.*

Convolvulus obscurus Linn. Sp. Pl. ed. 2 (1762) 220.

BOETON, Baoe baoe, *Rel. Robins. 2418*, July 13, 1913.

India to Malaya, the Mascarene Islands and tropical East Africa.

IPOMOEA sp.

BOETON, Baoe baoe, along the beach, *Rel. Robins. 2477*, July 13, 1913.

ERYCIBE Roxburgh

ERYCIBE LATERIFLORA Elm. Leafl. Philip. Bot. 5 (1913) 1767.

AMBOINA, Hitoe lama, *Rel. Robins. 1822*, November 6, 1913, in forests at an altitude of about 75 meters.

Previously known only from Palawan, Philippine Islands.

BORAGINACEAE

EHRETIA Linnaeus

EHRETIA MICROPHYLLA Lam. Ill. 1 (1791–97) 425.

Ehretia buxifolia Roxb. Pl. Coromandel. 1 (1795) 42, *t. 57*.

AMBOINA, from cultivated (?) plants in the town of Amboina, *Rel. Robins. 1850*, September 13, 1913, locally known as *te*.

India to Malaya and the Marianne Islands.

HELIOTROPIUM Linnaeus

HELIOTROPIUM INDICUM Linn. Sp. Pl. (1753) 130.

AMBOINA, in the town of Amboina about houses, *Rel. Robins. 1851*, November 21, 1913.

Widely distributed in the tropics of the Old World.

TOURNEFORTIA Linnaeus

TOURNEFORTIA SARMENTOSA Lam. Ill. 1 (1791–97) 416.

AMBOINA, Liang, *Rel. Robins. 1852*, November 29, 1913, climbing over trees at low altitudes.

Mauritius, Java, Timor, and the Philippines.

The Amboina plant seems to be specifically identical with the Philippines form that Gagnepain, Not. Syst. 3 (1914) 33, states is identical with Lamarck's type, which was from Mauritius.

VERBENACEAE

GEUNSIA Blume

GEUNSIA PENTANDRA (Roxb.) comb. nov.

Callicarpa pentandra Roxb. Hort. Beng. (1814) 83, *nomen nudum*, Fl. Ind. ed. 2, 1 (1832) 395.

Geunsia hookeri Merr. in Philip. Journ. Sci. 7 (1912) Bot. 342.

AMBOINA, Soja, *Rel. Robins. 1860*, October 24, 1913, in light forests at an altitude of about 300 meters; Koesoekoesoe sereh, *Rel. Robins. 1861*, October 3, 1913, in light forests at an altitude of about 275 meters.

Callicarpa pentandra Roxb. was very inadequately described, the original description being as follows: "10. *C. pentandra* R. Shrubby, tender parts mealy. Leaves opposite, with an alternate one between, oblong, entire, cuspidate. Corymbs axillary. Flowers pentandrous. Stigma from three to four-lobed. A native of the Moluccas." It has been reduced to *Geunsia farinosa* Blume, but the Amboina specimens do not agree with those from Java and the Malay Peninsula. I consider that the specimens cited above represent exactly the same species that I recently described from Philippine material as *Geunsia hookeri*, and accordingly have adopted Roxburgh's specific name for it in place of the more recent *Geunsia hookeri* Merr. So far this particular species is known only from the Philippines and Amboina.

STACHYTARPHETA Vahl

STACHYTARPHETA JAMAICENSIS (Linn.) Vahl Enum. 1 (1805) 206.

Verbena jamaicensis Linn. Sp. Pl. (1753) 19.
Stachytarpheta indica Vahl Enum. 1 (1805) 206.

AMBOINA, *Rel. Robins. 1868*, August 20, 1913, near the town of Amboina, very common, locally known as *biana blau*. BALI, Boeleleng, *Rel. Robins. 2524*, July 7, 1913.

A native of tropical America, now found in all tropical countries.

STACHYTARPHETA MUTABILIS (Jacq.) Vahl Enum. 1 (1805) 209.

Verbena mutabilis Jacq. Coll. 2 (1788) 334.

AMBOINA, Batoe batoe, *Rel. Robins. 1869*, August 25, 1913, along roadsides.

A native of tropical America, now found in India, Java, Queensland, and tropical Africa.

LIPPIA Linnaeus

LIPPIA NODIFLORA (Linn.) Rich. in Michx. Fl. Bor. Am. 2 (1803) 15.

Verbena nodiflora Linn. Sp. Pl. (1753) 20.

AMBOINA, *Rel. Robins. 1863*, September 13, 1913, in waste places about the town of Amboina.

A native of tropical America, now widely distributed in all tropical countries.

VITEX Linnaeus

VITEX PUNCTATA Schauer in DC. Prodr. 11 (1847) 687.

Vitex hollrungii Warb. in Engl. Bot. Jahrb. 18 (1893) 208.

AMBOINA, Paso, *Rel. Robins. 1867*, November 25, 1913, near the beach, almost among the mangrove trees.

The type of *Vitex punctata* Schauer was from the Moluccas, and the Amboina specimen cited above agress perfectly with the description. *Vitex hollrungii* Warb., of New Guinea, of which a fragment of the type collection is before me, impresses me as being identical with the Amboina material, and the species is accordingly reduced to the much older *Vitex punctata* Schauer.

CLERODENDRON Linnaeus

CLERODENDRON MACROSTEGIUM Schauer in DC. Prodr. 11 (1847) 666.

AMBOINA, Halong, *Rel. Robins. 1864*, September 26, 1913, in forests at an altitude of about 250 meters.

I cannot distinguish this from the common Luzon and Mindoro form, and believe that it represents the same species. It has already been reported from Ceram by Miquel in Ann. Mus. Lugd.-Bat. 3 (1867) 253.

CLERODENDRON SERRATUM (Linn.) Spreng. Syst. 2 (1825) 758.

Volkameria serrata Linn. Mant. 1 (1767) 90.

CELEBES, Macassar, *Rel. Robins. 2463*, July 13, 1913.
India to Java.

CLERODENDRON THOMSONAE Balf. in Edinb. New Philos. Journ. N. S. 15 (1862) 233.

AMBOINA, *Rel. Robins. 1866*, September 13, 1913, from cultivated plants in the town of Amboina.

A native of tropical Africa, now widely cultivated in most tropical countries for ornamental purposes.

LANTANA Linnaeus

LANTANA CAMARA Linn. Sp. Pl. (1753) 627.

AMBOINA, Paso, *Rel. Robins. 1865*, October 31, 1913, along the beach, rare. BALI, Boeleleng, *Rel. Robins. 2516*, July 7, 1913.

A native of tropical America, now found in most tropical countries.

AVICENNIA Linnaeus

AVICENNIA ALBA Blume Bijdr. (1826) 821 var. **ACUMINATISSIMA** var. nov.

A type differt foliis angustioribus, longissime tenuiterque acute acuminatis.

The leaves are lanceolate to narrowly lanceolate, 7 to 10 cm long, 1 to 2 cm wide, subequally narrowed at both ends, the apex very long and slenderly subcaudate-acuminate, when young minutely and densely cinereous-puberulent on the lower surface, when mature, quite glabrous.

AMBOINA, Liang, *Rel. Robins. 1862*, November 29, 1913, along the beach, locally known as *brappat* and as *mangi mangi*.

This peculiar form, which is apparently no more than a variety of *Avicennia alba* Blume, although strongly characterized by its narrow, very slenderly and sharply acuminate, ultimately quite glabrous leaves, is certainly not included by Rumphius in his description of *Mangium album* (*Avicennia officinalis* Linn.)

LABIATAE

HYPTIS Jacquin

HYPTIS CAPITATA Jacq. Ic. Pl. Rar. 1 (1781–86) *t. 114*.

AMBOINA, *Rel. Robins. 2002*, August 23, 1913, in a sago swamp near the town of Amboina.

A native of tropical America, introduced into the Marianne Islands and into the Philippines from Mexico at an early date, now also found in Java, but not previously reported from the Moluccas.

HYPTIS BREVIPES Poir. in Ann. Mus. Paris 7 (1806) 465.

CELEBES, Macassar, *Rel. Robins. 2457*, July 11, 1913.

A native of tropical America, now widely distributed in the tropics of both hemispheres.

HYPTIS SUAVEOLENS (Linn.) Poir. in Ann. Mus. Paris 7 (1806) 472, *t. 29, f. 2.*

Ballota suaveolens Linn. Syst. ed. 10 (1759) 1100.

AMBOINA, Gelala, *Rel. Robins. 2003*, August 15, 1913, in waste places.

Like the preceding species a native of tropical America, now widely distributed in the tropics of both hemispheres.

COLEUS Loureiro

COLEUS sp..

CELEBES, Macassar, *Rel. Robins. 2461*, July 11, 1913.

SCROPHULARIACEAE

STRIGA Loureiro

STRIGA MULTIFLORA Benth. Comp. Bot. Mag. 1 (1835) 363.

AMBOINA, Soeli, *Rel. Robins. 1769*, in grass lands at an altitute of about 20 meters, the flowers pink.

Philippines, Moluccas, and tropical Australia.

ADENOSMA R. Brown

ADENOSMA JAVANICUM (Blume) comb. nov.

Herpestis javanica Blume Bijdr. (1826) 748.
Herpestis ovata Benth. Scroph. Ind. (1835) 30.
Adenosma ovatum Benth. in Hook. f. Fl. Brit. Ind. 2 (1884) 263.

AMBOINA, Batoe merah River, *Rel. Robins. 1771*, September 24, 1913, on clay banks at an altitude of about 120 meters.

Indo-China, the Philippines, and the Malay Peninsula and Archipelago.

TORENIA Linnaeus

TORENIA PEDUNCULARIS Benth. in Wall. Cat. (1831) no. 3956; Hook. f. Fl. Brit. Ind. 4 (1884) 276.

AMBOINA, Batoe merah, *Rel. Robins. 1770*, July 20, 1913, in rocky soil, altitude 5 to 15 meters. BOETON, Baoe baoe, *Rel. Robins. 2487*, July 13, 1913.

Malay Peninsula and Indo-China to the Philippines, and the Moluccas.

LINDERNIA Allioni

LINDERNIA PUSILLA (Thunb.) comb. nov.

Selago pusilla Thunb. Prodr. Pl. Cap. (1794–1800) 99.
Gratiola pusilla Willd. Sp. Pl. 1 (1797) 105.
Vandellia scabra Benth. Scroph. Ind. (1835) 36.
Vandellia pusilla Merr. in Philip. Journ. Sci. 7 (1912) Bot. 246.

AMBOINA, *Rel. Robins. 1768*, near the town of Amboina in grassy places near streams at low altitudes.

Tropical Asia and Malaya.

SCOPARIA Linnaeus

SCOPARIA DULCIS Linn. Sp. Pl. (1753) 116.

BALI, Boeleleng, *Rel. Robins. 2528*, July 7, 1913.

A native of tropical America, now widely distributed in all tropical countries.

BIGNONIACEAE

CRESCENTIA Linnaeus

CRESCENTIA CUJETE Linn. Sp. Pl. (1753) 626.

AMBOINA, cultivated in the town of Amboina, *Rel. Robins. 1780*, August 12, 1913.

The calabash tree is a native of tropical America, but is now widely distributed in various other tropical countries in cultivation; probably of comparatively recent introduction in Amboina.

GESNERIACEAE

RHYNCHOGLOSSUM Blume

RHYNCHOGLOSSUM OBLIQUUM Blume Bijdr. (1826) 741.

AMBOINA, Mahiya, *Rel. Robins. 1729*, August 12, 1913, on limestone rocks at an altitude of about 300 meters.

Burma through Malaya and the Philippines to Timor and Amboina, with a variety in India.

EPITHEMA Blume

EPITHEMA BRUNONIS Dene. var. **LONGIPETIOLATUM** var. nov.

A typo differt foliis majoribus, usque ad 12 cm longis, inferioribus longe petiolatis, petiolo 7 ad 10 cm longo.

The leaves are equilateral or nearly so, broadly subtruncate-rounded to shallowly cordate at the base. The lower petioles attain a maximum length of 10 cm, those of the upper leaves shorter, rarely as short as 1.5 cm.

AMBOINA, Halong, *Rel. Robins. 1727*, September 26, 1913, on limestone rocks at an altitude of from 50 to 100 meters, flowers pale blue.

TRICHOSPORUM Blume

TRICHOSPORUM AMBOINENSE sp. nov. § *Holocalyx*.

Frutex scandens inflorescentiis exceptis glaber; foliis breviter petiolatis, crasse coriaceis, in siccitate pallidis, ovatis ad elliptico-ovatis, 3 ad 4 cm longis, obtusis ad brevissime late acuminatis, basi rotundatis vel leviter cordatis; inflorescentiis axillaribus, solitariis vel binis, breviter pedunculatis subtrifloris, parce pubescentibus; calycis cylindraceis, subtruncatis, late breviter denticulatis, extus parce pubescentibus, 8 ad 10 mm longis; corolla coccinea, sursum gradatim ampliata, circiter 3 cm longa, extus parce pilosa, tubo leviter curvato; capsulis 8 ad 17 cm longis, circiter 3 mm diametro.

AMBOINA, Mahiya, *Rel. Robins. 1728*, August 12, 1913, hanging over rocks at an altitude of about 300 meters; locally known as *manumpang*.

The alliance of this species is manifestly with *Trichosporum* (*Aeschynanthus*) *volubile* (Jack) Nees, from which it differs in its somewhat smaller leaves; shorter, pubescent calyx; and distinctly longer corolla.

ACANTHACEAE

JUSTICIA Linnaeus

JUSTICIA PROCUMBENS Linn. Sp. Pl. (1753) 15.

Rostellularia procumbens Nees in Wall. Pl. As. Rar. 3 (1833) 101, DC. Prodr. 11 (1857) 371.

BALI, Boeleleng, *Rel. Robins. 2527*, July 7, 1913.

Widely distributed in the tropics of the Old World.

RUELLIA Linnaeus

RUELLIA FLAGELLIFORMIS Roxb. Hort. Beng. (1814) 95, *nomen nudum*, Fl. Ind. ed. 2, 2 (1832) 47.

AMBOINA, Paso, *Rel. Robins. 1790*, October 31, 1913, near the seashore.

A species originally and very imperfectly described from specimens originating in the Moluccas, possibly in Amboina. The excellent specimens here referred to Roxburgh's species agree perfectly with the description so far as it goes, and unquestionably represent it.

HYPOESTES R. Brown

HYPOESTES LAXIFLORA Nees in DC. Prodr. 11 (1857) 508.

AMBOINA, *Rel. Robins. 1789*, September 25, 1913, in Rumphius's garden, town of Amboina, locally known as *bunga burong*.

Java and the Philippines to tropical Australia. Closely allied to *Hypoestes malaccensis* Wight, and *H. decaisneana* Nees. The Amboina specimen is a close match for Philippine material, *Cuming 1019*, cited by Nees in the original description of *Hypoestes laxiflora* Nees.

ERANTHEMUM Linnaeus

ERANTHEMUM sp.

AMBOINA, *Rel. Robins. 1791*, September 25, 1913, a cultivated shrub, collected in the town of Amboina.

PERISTROPHE Nees

PERISTROPHE COMMUTATA Nees in DC. Prodr. 11 (1857) 497.

Justicia bivalvis Roxb. Fl. Ind. ed. 2, 1 (1832) 42, non Linn.

AMBOINA, *Rel. Robins. 2542*, July 22, 1913, along the river bank in the vicinity of the town of Amboina, locally known as *daun mariaya*.

Peristrophe commutata Nees was based wholly on Roxburgh's description of *Justicia bivalvis*, the latter being based on specimens from the Moluccas, in all probability from Amboina. The description, although short and very incomplete, applies unmistakably to the specimen cited above, which is distinguished from *Peristrophe bivalvis* (Linn.) Merr. (*P. tinctoria* Nees) by its much narrower, lanceolate leaves, and its much narrower, linear-lanceolate bracts.

LEPIDAGATHIS Willdenow

LEPIDAGATHIS ROBINSONII sp. nov.

Herba erecta, simplex vel parce ramosa, circiter 70 cm alta, inflorescentiis leviter ciliatis exceptis glabra; foliis submembranaceis, in siccitate olivaceis, ovatis ad oblongo-ovatis, usque ad 14 cm longis, leviter undulatis, acuminatis, basi subabrupte decurrento-acuminatis, nervis utrinque 5 vel 6; spicis terminalibus, brevibus, solitariis vel trinis, circiter 2 cm longis, in siccitate brunneis, bracteis bracteolisque subsimilis, circiter 10 mm longis, tenuiter acutissime acuminatis, parce ciliatis; calycis segmentis 5, omnibus liberis, valde inaequimagnis, superioribus et inferioribus circiter 9 mm longis, lateralibus lineari-lanceolatis, 6 ad 7 mm longis, leviter ciliatis.

An erect, simple or sparingly branched, nearly glabrous herb about 70 cm high, the older parts of the stem terete, the younger parts 4-angled, brown, with numerous small cystoliths similar to those on both surfaces of the leaves. Leaves submembranaceous, olivaceous and slightly shining when dry, glabrous, ovate, rarely oblong-ovate, entire or obscurely undulate, 8 to 14 cm long, 3.5 to 7 cm wide, gradually narrowed from about the lower one-third to the acuminate apex, the base rather abruptly decurrent-acuminate; lateral nerves 5 or 6 on each side of the midrib, rather prominent, curved; petioles 1.5 to 4 cm long. Spikes terminal, solitary, sometimes in pairs or in threes, brown when dry, dense, oblong-ovoid, about 2 cm long, scarcely secund. Bracts and bracteoles similar, sparingly but prominently ciliate on the margins above, oblong to oblong-lanceolate, long and slenderly acuminate, the acumen very sharp and apiculate, the bracts about 10 mm long and 3 to 3.2 mm wide, the bracteoles slightly smaller. Calyx 5-parted, the lobes free or nearly so, the upper one lanceolate, 9 mm long and 2 mm wide, the two lower ones free, linear-lanceolate, as long as the upper one and about 1 mm wide, the two lateral ones linear, 1 mm wide or less below, 6 to 7 mm long, much narrowed upward, all more or less ciliate, and very slenderly and sharply acuminate.

AMBOINA, Koesoekoesoe sereh and Soja, *Rel. Robins. 1785*, August, 1913, in forests, altitude 200 to 400 meters.

A species perhaps as closely allied to *Lepidagathis capitata* O. Kuntze as to any other species; well characterized, however, by its short, brown spikes; its rather large, long-petioled, peculiarly shaped leaves; its sparingly ciliate bracts and bracteoles; and its very unequal calyx-segments, the two lower ones being free or at least only very slightly united, the two lateral ones being narrower, and much shorter than the other three.

PSEUDERANTHEMUM Radlkofer

PSEUDERANTHEMUM DEPAUPERATUM sp. nov.

Planta erecta, simplex vel parcissime ramosa, herbacea e basi suffruticosa, 10 ad 25 cm alta, partibus junioribus inflorescentiisque minute pubescentibus; foliis membranaceis vel chartaceis, ovatis ad oblongo-ovatis, 3 ad 6 cm longis, obscure acuminatis ad obtusis, nervis utrinque circiter 5; inflorescentiis terminalibus, racemosis vel anguste et depauperato-paniculatis; floribus albis, circiter 1.5 cm longis, sepalis linearis, acuminatis, 3 ad 6 mm longis.

An erect, simple or sparingly branched herbaceous plant from a suffrutescent base, 10 to 25 cm high, nearly glabrous except the rather minutely pubescent younger parts and inflorescence. Suffrutescent parts of the stems terete, smooth, shining straw-

colored, the herbaceous parts subolivaceous. Leaves ovate to oblong-ovate, chartaceous or submembranaceous, 3 to 6 cm long, 1 to 2.5 cm wide, acuminate to obtuse, base usually rather abruptly decurrent-acuminate, the cystoliths minute, numerous on both surfaces; lateral nerves about 5, slender, distinct; petioles about 1 cm long. Inflorescence, terminal, racemose, or a narrow, depauperate panicle, up to 10 cm in length, pubescent, the flowers white, rather scattered, solitary, or the lower ones few and on very short branches. Pedicels 1 to 2 mm long, pubescent, the bracts very small, oblong, less than 1 mm long. Calyx cleft nearly or quite to the base into five, linear, acuminate, 3 to 4 mm long, equal segments, rather minutely pubescent. Corolla-tube about 1.5 cm long, slender, cylindric, the lobes 5, spreading, two somewhat larger than the other three, elliptic, rounded, 4 to 5.5 mm wide, 7 to 8 mm long. Stamens 2; anthers slightly exserted, 2-celled, cells contiguous, rounded, base acute, the pollen typical "spangenpollen." Capsules 1 to 1.4 cm long. Seeds 4, flattened, foveolate, rounded, nearly 3 mm long.

AMBOINA, Halong, on limestone rocks, Batoe merah, and near the town of Amboina, *Rel. Robins. 1792* (type) August and September, 1913, altitude 5 to 50 meters. The same form is represented by *Merrill 5346* from Palmas Island, southeast of Mindanao, a small islet belonging to the Dutch East Indies, not to the Philippines.

A species well characterized by its small size, suffrutescent basal parts, and slightly pubescent inflorescences which are terminal, racemose or depauperate-paniculate, and its comparatively small leaves.

THUNBERGIA Retzius

THUNBERGIA GRANDIFLORA Roxb. Hort. Beng. (1814) 45, Fl. Ind. ed. 2, 3 (1832) 34, Spreng. Syst. 2 (1825) 828.

Flemingia grandiflora Roxb. ex Rottl. in Ges. Naturf. Fr. Neue Schr. 4 (1803) 202.

AMBOINA, *Rel. Robins. 1786*, September 16, 1913, in hedges, town of Amboina, September 16, 1913.

A native of India, now widely cultivated in various tropical countries.

THUNBERGIA ALATA Bojer in Hook. Exot. Fl. (1823–27) *t. 177*.

AMBOINA, *Rel. Robins. 1788*, July 22, 1913, along river banks, town of Amboina, locally known as *bunga tikus*.

A native of tropical Africa, now widely distributed in the tropics of both hemispheres.

SANCHEZIA Ruiz and Pavon

SANCHEZIA NOBILIS Hook. f. in Curtis's Bot. Mag. *t. 5594*.

AMBOINA, *Rel. Robins. 1787*, July 25, 1913, along small streams in a sago swamp near the town of Amboina.

A native of South America, probably of recent introduction into Amboina from Java, where it is cultivated as an ornamental plant.

ASYSTASIA Blume

ASYSTASIA GANGETICA (Linn.) T. And. in Thwaites Enum. Pl. Zeyl. (1859–64) 235.

Justicia gangetica Linn. Cent. Pl. 2 (1756) 3, Amoen. Acad. 4 (1759) 299.

Asystasia coromandelica Nees in Wall. Pl. As. Rar. 3 (1832) 89.

AMBOINA, *Rel. Robins. 1784*, July and August, 1913, along river banks near the town of Amboina.

A native of tropical Asia, now widely distributed in the tropics of the Old World, probably largely distributed as an ornamental plant, but readily establishing itself.

CUCURBITACEAE

MELOTHRIA Linnaeus

MELOTHRIA MUCRONATA (Blume) Cogn. in DC. Monog. Phan. 3 (1881) 608.

Bryonia mucronata Blume Bijdr. (1826) 923.

AMBOINA, Soja, *Rel. Robins. 1870*, October 24, 1913, in light woods, altitude about 225 meters.

India to Formosa, southward to Java, Borneo, Celebes, and Amboina.

CAMPANULACEAE

ISOTOMA Lindley

ISOTOMA LONGIFLORA (Mill.) Presl Prodr. Lobel. (1836) 42.

Rapuntium longiflorum Mill. Gard. Dict. ed. 8 (1768) no. 7.

AMBOINA, *Rel. Robins. 1848*, July 29, 1913, in drains along fence rows in the town of Amboina.

A native of tropical America, now widely distributed in many other tropical countries, cultivated and spontaneous.

PRATIA Gaudichaud

PRATIA OVATA Elm. Leafl. Philip. Bot. 2 (1909) 593.

AMBOINA, Kati-kati, *Rel. Robins. 1847*, October 19, 1913, in a wet meadow at an altitude of about 70 meters.

Known from a number of localities in the Philippines, from northern Luzon to southern Mindanao, but not previously reported from any region outside of the Philippines. It may prove to be a species of *Lobelia* when the mature fruits are known.

GOODENIACEAE

SCAEVOLA Linnaeus

SCAEVOLA OPPOSITIFOLIA Roxb. Hort. Beng. (1814) 85, *nomen nudum*, Fl. Ind. ed. 2, 1 (1832) 528.

AMBOINA, Caju poeti, *Rel. Robins. 1730*, August 2, 1913, in open woods at an altitude of about 350 meters.

A species of the section *Enantiophyllum* known only from Amboina and Ternate. It was originally described from Amboina specimens.

COMPOSITAE

VERNONIA Schreber

VERNONIA MOLUCCENSIS (Blume) Miq. Fl. Ind. Bat. 2 (1857) 19.

Cyanthillium moluccense Blume Bijdr. (1826) 890.

AMBOINA, Hitoe messen, *Rel. Robins. 1839*, October 14, 1913, clearings in light forests at an altitude of 175 meters; Mahija, *Rel. Robins. 1834*, August 12, 1913, on limestone formation, altitude about 300 meters; locally known as *biana perumpuan.*

The identification with *Vernonia moluccensis* Miq. has been made wholly from a comparison of the specimens with the published descriptions, and needs verification by comparison with type or authentically named material. Reported only from the Moluccas.

ELEPHANTOPUS Linnaeus

ELEPHANTOPUS SCABER Linn. Sp. Pl. (1753) 814.

AMBOINA, near the town of Amboina, *Rel. Robins. 1842*, July 31, 1913, on a fern-covered hillside. BALI, Boeleleng, *Rel. Robins. 2522*, July 7, 1913.

All tropical countries, probably a native of tropical America.

EUPATORIUM Linnaeus

EUPATORIUM sp.

AMBOINA, Kati-kati, *Rel. Robins. 1844*, October 19, 1913, from cultivated specimens.

I am unable to determine this plant to the species from the literature and material available for comparison at this time. It is apparently an exotic species, judging from the fact that it occurs in Amboina in cultivation.

SPARGANOPHORUS Vaillant

SPARGANOPHORUS VAILLANTII Crantz Instit. 1 (1766) 261.

AMBOINA, near the town of Amboina, *Rel. Robins. 1843*, July 22, 1913, along streams.

Tropical Africa and America, introduced in the Malayan region, Java, Singapore, etc.

MIKANIA Willdenow

MIKANIA SCANDENS (Linn.) Willd. Sp. Pl. 3 (1800) 1743.

Eupatorium scandens Linn. Sp. Pl. (1753) 836.

AMBOINA, Gelela, *Rel. Robins. 1838*, September 19, 1913, along small streams at an altitude of about 40 meters.

Tropics of both hemispheres.

ERIGERON Linnaeus

ERIGERON LINIFOLIUS Willd. Sp. Pl. 3 (1800) 1955.

AMBOINA, Soja, *Rel. Robins. 1840*, August 4, 1913, along roadsides, altitude about 400 meters, only two plants seen.

Widely distributed in most warm countries.

BLUMEA DeCandolle

BLUMEA LACERA (Burm.) DC. in Wight Contrib. (1834) 14.

Conyza lacera Burm. Fl. Ind. (1768) 180, *t. 59, f. l.*

CELEBES, Macassar, *Rel. Robins. 2458*, July 11, 1913. The specimen does

not present the lyrately lobed leaves of the type, as illustrated by Burman, but seems to be the form described by DeCandolle l. c. as *Blumea lacera* var. *commersonii* DC.

Tropical Africa and Asia to Malaya.

SPHAERANTHUS Linnaeus

SPHAERANTHUS AFRICANUS Linn. Sp. Pl. ed. 2 (1763) 1314.

BALI, Boeleleng, *Rel. Robins. 2529*, July 7, 1913.

Tropical Africa and Asia through Malaya to Australia.

SYNEDRELLA Gaertner

SYNEDRELLA NODIFLORA (Linn.) Gaertn. Fruct. 2 (1791) 456, *t. 171, f. 7.*

Verbesina nodiflora Linn. Cent. Pl. 1 (1755) 28.

AMBOINA, common in waste places about the town of Amboina, *Rel. Robins. 1835*, August 20, 1913.

A native of tropical America, now widely distributed in all tropical countries.

TRIDAX Linnaeus

TRIDAX PROCUMBENS Linn. Sp. Pl. (1753) 900.

AMBOINA, in waste places near Castle Victoria, *Rel. Robins. 1841*, August 11, 1913.

A native of tropical America, introduced and now abundant in parts of India, Indo-China, the Malay Peninsula, etc., but not as yet found in the Philippines.

COSMOS Cavanilles

COSMOS CAUDATUS HBK. Nov. Gen. Sp. Pl. 4 (1816) 240.

AMBOINA, Lateri, *Rel. Robins. 1837*, August 25, 1913, locally known as *sunga sunga blanda.*

A native of tropical America, now widely distributed in other tropical countries.

TITHONIA Desfontaine

TITHONIA DIVERSIFOLIA A. Gray in Proc. Am. Acad. 19 (1883) 5.

AMBOINA, *Rel. Robins. 1845*, August 19, 1913, river banks, near the town of Amboina, from the field note apparently spontaneous.

A native of Mexico, probably of very recent introduction in Amboina, as it is in other parts of Malaya, where it is cultivated for ornamental purposes.

ERECHTITES Rafinisque

ERECHTITES VALERIANIAEFOLIA (Wolf) DC. Prodr. 6 (1837) 295.

Senecio valerianiaefolius Wolf Ind. Sem. Hort. Berol. (1825), ex Reichenb. Ic. Bot. Exot. 1 (1827) 59.

AMBOINA, Soja, *Rel. Robins. 1836*, August 4, 1913, roadsides at an altitude of about 400 meters.

A native of Brazil, introduced and now widely distributed in the Malay Archipelago and the southern Philippines.

ERRATA

Page 45, line 11 from the bottom, for *abyssinisa* read *abyssinica.*
Page 72, line 11 from the bottom, for **fauciflorus** read **pauciflorus.**
Page 101, line 15 from the bottom, for *Rhumphianae* read *Rumphianae.*

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[New genera, new species, and combinations published for the first time are in **black-faced type**; synonyms and species incidentally mentioned in the text are in *italics*.]

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